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IN MEMORIAM

HELMER SMEDS

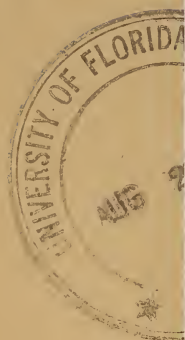
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ACTA GEOGRAPHICA

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Helmer Sveds

29. 7. 1908 — 8. 12. 1967

THE SCIENTIFIC PRODUCTION OF HELMER SMEDS

by

PAUL FOGELBERG

Department of Geography, University of Helsinki

Helmer Smeds was born at Petalax on the Ostrobothnian coast, on July 29th, 1908. He was the second eldest of twelve children of a land surveyor. In 1926 he gained entrance to the University of Helsinki and obtained his Master's degree in 1929. In this year his first publication appeared in print, a study of the economy of out-lying stock-farms in southern Ostrobothnia. This was Helmer Smeds's native region, the geography and people of which he had been interested in since early youth, an interest which continued with him for the rest of his life. When working as a schoolteacher in the subsequent years, Helmer Smeds continued his Ostrobothnian research. His following two publications (1931 and 1934) bear witness to wide reading, rare in a man of such youth, and they reflect a profound feeling and understanding of Southern Ostrobothnia and its inhabitants. The great task in those years, however, was the completion of his doctoral thesis, a comprehensive monograph on the human geography and rural life of the Malax region situated south of Vaasa (1935). This work may be classified as regional geography in the real classical sense of the word, as it fulfils completely Hettner's concept of "die Erfüllung der Räume". The influence of French masters can also be traced clearly, perhaps especially that of Vidal de la Blache. Even at this early stage, Smeds appears to have outlined for himself a distinct vision of the purpose and logical system of geography. A quotation from Vidal de la Blache: "Geography... is interested in the events of history so far as these bring to work and to light, in the countries where they take place, qualities and potentialities

which without them would remain latent", could, in fact, have served as a motto for the dissertation, as one of its main merits consists of the method of projecting history upon the rural landscape to explain its genesis, as well as the cartographic representation of this. With reference to its theme and method, Smeds's work constitutes a pioneer study in Finland. It is only to be regretted that many results and conclusions remain concealed in the perhaps too diffuse descriptive text.

After obtaining his Doctor's degree, Helmer Smeds continued teaching geography and biology, first at a teachers' training college, then at a secondary school, until 1941. This work was interrupted by war service in 1939—40 and in 1941, when he was wounded and invalidated out of the army. His literary production in 1936—1940 comprises a number of shorter papers, many of them brilliant essays, which largely dealt with political themes, treated from a geographical point of view. It is worth mentioning that, in one of these papers, Smeds documented for the first time his interest in Africa (1938).

In 1942, Dr. Smeds was appointed professor of economic geography at the Swedish School of Economics in Helsinki. In the following year he also became a docent at the University of Helsinki. During the 1940's, his scientific activity was concentrated mainly upon the following themes: settlement geography of Finland, regional geography of the Finnish archipelagoes and of southern Ostrobothnia, and global agricultural economic geography. His interest in regional geography outside Finland was largely concentrated on the Soviet Union, as evidenced by a book published in 1945, which resulted from cooperation between Helmer Smeds and his friend Jorma Mattila.

In 1950, Helmer Smeds was appointed professor of geography at the University of Helsinki. His inaugural lecture (published in 1950) dealt with the Ostrobothnian coast. This lecture gave the impression that Prof. Smeds was delineating a wide-ranging research project. However, he did not ultimately devote much to this subject, with the exception perhaps of the publication of a semi-popular book about the Vaasa region (1953) and his chairmanship of an editorial board responsible for the publishing of an atlas of the archipelago of southwestern Finland. During his period as Chairman of the Department of geography in 1950—1953, he was occupied mainly with research on the population and settlement geography of Finland. This work was, to a great extent, stimulated by the general census of 1950, in which,

for the first time, an attempt was made to distinguish urban from rural population on a more realistic basis than administrative boundaries. Smeds made important contributions to the concept of "urban settlement", (1952, 1953) and published a map of the urban and rural population of southern Finland as well.

At the same time, Helmer Smeds commenced on a bold project: an investigation of the human geography of the Ethiopian highlands. On five visits, totalling almost three years, he obtained with very modest means, on foot and on mule-back, a solid insight into the nature of the country and its problems. Few geographers today have exerted themselves like Helmer Smeds in the tropical bush. In his activity as an explorer, he seems to have been animated by an irrepressible will, "sisu" in the real sense of the word. From 1955 onwards, he published nine papers on Ethiopia, comprising together 150 pages. In addition, the journeys to the tropics no doubt widened Smeds's outlook on general African problems and that of the supply of food-stuffs and inspired him to write papers dealing with such topics (three papers in 1963 and 1965).

In the 1960's a new branch of Helmer Smeds's scientific activity becomes apparent: the agricultural geography of Finland. His interest in this theme had roots, no doubt, both in the work of his doctoral thesis and in his studies of the agricultural geography of Ethiopia. He published five articles between 1960 and 1966 dealing with problems of trends in plant cultivation and livestock keeping, as well as with the structure of Finnish farming.

Helmer Smeds was also actively involved in the distribution of knowledge of the geography of Finland to foreign countries, perhaps more so than any other contemporary Finnish geographer. The chapter on Finland in *Geography of Norden* (1960 and 1968) and its equivalent in the German language edition (1967), and the book *Winter in Finland* (written in collaboration with W. R. Mead) are the foremost of these contributions. Smeds wrote about various aspects of Finland, too, in Finnish in a book *Nyky-Suomi kuvin ja kartoin*, which was written in cooperation with the writer of these lines. Finally, no account of his writings would be complete without mentioning many articles in newspapers and a great number of book reviews, mainly published in *Terra*.

Helmer Smeds was known as an active man, and there were many projects he still wanted to fulfil, not least his Ethiopian research.

When he went into hospital in October 1967 because of a persistent influenza, as he thought, it must have been impossible for him to imagine that he was not to return from there again. However, it was gradually discovered that he was suffering from a complex disease of tropical origin. Despite all the efforts of his physicians, his condition slowly deteriorated and he died two months after having entered the hospital, on December 8th, 1967.

The many-sided activities of Helmer Smeds as a researcher and explorer, and his literary production guarantee him an important place in the history of Finnish geography. His writings bear witness to exceptionally varied interests as well as to a faculty to grasp quickly current problems and to analyse them objectively. He was a passionate reader of both scientific works and fiction, but he was no arm-chair scholar. He preferred to deal with matters of the moment, and his solutions to different problems were often ingenious and unconventional. They were never just the desk constructions of a theorist out of touch with reality. Modest as he was, Helmer Smeds never sought publicity and distinction for himself. On the other hand, he was a fearless champion of ideas he considered right. This often emerged in the form of polemics, both in newspapers and in scientific journals. Occasionally he would reproach his colleagues and pupils for being merely passive spectators in the development of community life, for choosing irrelevant research topics, and for not letting their voices be heard in public. This, even though it is not said in plain terms, was the gist of his presidential address in 1966 to the Geographical Society of Finland (published in 1967 in *Terra*).

Helmer Smeds was a typical representative of the "old" school of geography. He advocated energetically the unity of geography as a science and resisted its too far-reaching specialization. His views on the spirit and purpose of geography are eloquently presented in two articles published in *Terra* in 1961 and 1962. Modern quantitative research methods did not appeal to him; he frequently pointed out that common sense and sensible thinking were worth more than computers.

Very characteristic of Helmer Smeds's alert intellect was that he seldom occupied himself with the same research project continuously for long periods of time. In this respect he was the complete opposite to, say, a specialist like the sort of a botanist who has devoted most of his life to research into a single genus or phylum. It may, perhaps, be said that some of his articles had the character of pamphlets

rather than that of scientific studies, and that the scope of his research was sometimes more broad than profound. In this respect it may be said that Helmer Smeds, as a result of his humanistic outlook on life and his interest in all forms of human activity, preferred a wider perspective in his research.

Prof. Smeds was abruptly snatched away in the midst of an active career. Consequently, he was unable to complete the research to which he had devoted most of his available time during the last decade of his life, that is to say, Ethiopian studies. While he had published many articles on different aspects of the Ethiopian highlands, the synthesis, or monograph, which he undoubtedly intended to write, remained unaccomplished.

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POPULATION PARAMETERS AND FUNCTIONAL REGIONS

by

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This paper deals with the rural population of the area shown in Figure 1.

Official Statistics of Finland (S.V.T. VI A: 119. Helsinki 1962) is the source for the figures in Table 1. We have here the 1960 figures for population (P), total net increase (y) etc. listed by communes.

In spite of their greatly varying size the communes are used as the smallest areal statistical elements. This is the role they play in this study. As areal elements, they are, for convenience, referred to by the numbers shown in Figure 1.

ANNUAL ACCRETION

Most awkwardness due to the inequality of statistical areas may be reduced if not wholly avoided by integration. Therefore, starting from the model

$$y = \int_0^P y(P) dP; (y'' < 0) \quad (1)$$

y is presented as a function of the upper limit of integration, $y = f(P)$. This is a way of getting an idea of the structural form in which the total is built up from the elements in a setting wholly free from the traditional space coordinates.

This is the way the author has proceeded in obtaining the graph of the structure of the total net increase in 1960, Curve 1 in Figure 2.



Fig. 1. The coastal area here dealt with. The rural communes are numbered whereas the letters point out the towns.

The said curve has a ceiling at an abscissa of about 3. A more detailed scrutiny indicates that the features of the curve differ on either side of the said value. More important than a banal asymmetry is, however, that the upstroke from the left rises rather steeply and then levels off at the ceiling. On the other side of the peak the curve first bends gently downward and then goes into a steeper dive.

Considering the derivatives, there is evidence that with $P < 3$, y'' is proportional to $-yy'$, and with $P > 3$, y'' is proportional to y . Consequently there are two distinct laws and as many components of change, which add up to form the curve under discussion.

Solving the differential equations implied in the previous paragraph, and determining the arbitrary constants to suit the data, gives

$$y = 520 \tanh (0.76 P) - 11 \sinh (0.48 P) \quad (2)$$

The proof of this finding is its adaptability, which may in this case be carried out by visual inspection. This is to say, one must consider Curve 1 in Figure 2, because this is the graph for Eq. (2), and it seems to describe the data satisfactorily.

Table 1. Figures for the rural communes in the area shown in Fig. 1. Year 1960 Census. Source: Official statistics of Finland, VI A:119. Helsinki 1962.

Commune v. Fig. 1	Population	Excess of births	Net migration	Total net change
2	6632	+ 66	+ 170	+ 236
7	4272	+ 54	+ 33	+ 87
4	2490	+ 34	+ 13	+ 47
17	7283	+ 43	+ 48	+ 91
5	3019	+ 40	— 20	+ 20
25	2264	+ 11	— 3	+ 8
30	2680	+ 27	— 26	+ 1
11	1740	+ 12	— 5	+ 7
12	2906	+ 5	— 6	— 1
9	2207	+ 10	— 12	— 2
20	3029	+ 12	— 15	— 3
8	2405	+ 25	— 28	— 3
21	3849	— 2	— 4	— 6
6	2996	+ 16	— 21	— 5
28	1130	— 2	— 1	— 3
23	1561	+ 14	— 19	— 5
26	2213	+ 3	— 10	— 7
18	1777	+ 5	— 11	— 6
1	659	+ 3	— 6	— 3
27	8496	+ 18	— 65	— 47
16	2963	—	— 17	— 17
14	5506	+ 4	— 41	— 37
3	1840	+ 1	— 8	— 7
10	2527	+ 12	— 16	— 4
29	4844	+ 13	— 64	— 51
13	3334	+ 6	— 41	— 35
15	1221	+ 9	— 29	— 20
19	536	+ 3	— 12	— 9
24	3443	— 24	— 39	— 63
22	719	+ 9	— 27	— 18
n = 30	90541	+ 427	— 282	+ 145

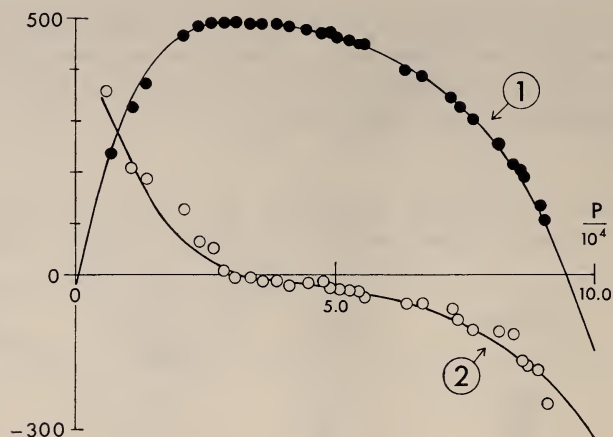


Fig. 2. (1) = the total net change; (2) = the rate of net change; both are expressed in terms of population, 1960.

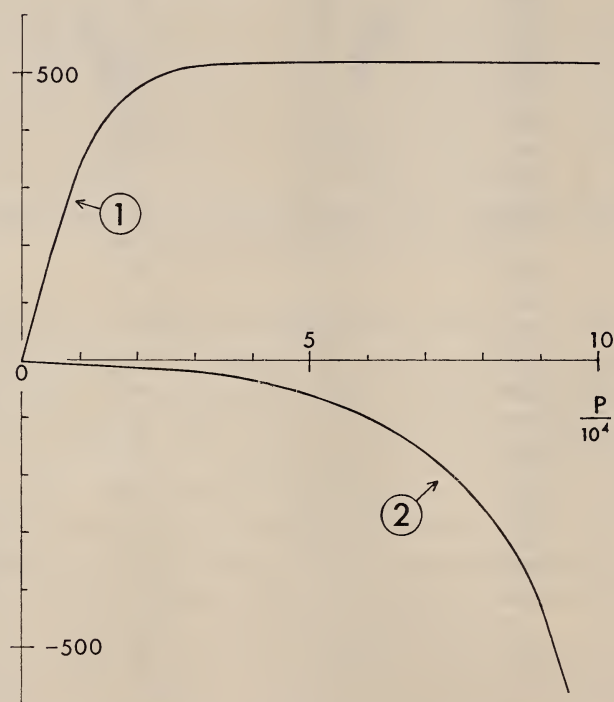


Fig. 3. The components of total net change, 1960.

RATE OF NET INCREASE

The acceptability of Eq. (2) may also be decided from the precision with which the analytical expression of y' as obtained from Eq. (2) corresponds with the finite difference approximation deduced from the data. This correspondence is of much more consequence than y' , the rate of total net increase being an important variate, as will be shown later on.

The observed y' values are easily deduced from the data in Table 1. In Figure 2 the observed values may be compared with those obtained by differentiating Eq. (2) and shown as Curve 2.

The fit is in this case not as good as it was with Curve 1. Its greater deviations find an explanation in the fact that finite difference approximations always are somewhat larger than those obtained from infinitesimals because, geometrically speaking, the finite difference expresses the secant slope which is greater than the slope of the tangent given by the infinitesimals. With due allowance for this, Curve 2 in Figure 2 is also found to describe satisfactorily the reality represented by the observed points. This fact greatly substantiates the suitability of Eq. (2) in describing the data given.

THE PARAMETERS

Admitting that Eq. (2) describes the total net increase of rural population in 1960, one cannot escape considering both components of the said curve. One component represents increasing values, the other decreasing ones. Each of them is fully determined by its two parameters. Both pass through the origin. \tanh is always less than its arguments in absolute value. It increases first rather strongly, then more gently, and finally it approaches asymptotically $y = 1$. On the other hand \sinh slopes very gently in the vicinity of the origin, then turns with accelerating speed towards infinity. Both components are shown in Figure 3. One soon realises that by giving appropriate values to the four parameters of the equation (2) it is possible to obtain every curve representing the total net growth of population at any point of time. The eventual use of an XY plotter would turn out to be a versatile way of solving various demographic problems.

In this connection it would be very interesting to see which parameter values could produce a satisfactory descriptor for the total net

increase in 1860. First, however, we are going to find out the values for which Eq. (2) is capable of describing the statistical or genetic components of the total net change. They are the distributions of the excess births and the net migration.

These latter components have been found for 1960 and shown as black curves in Figure 4. The excess of births is fitted to the open circles, whereas the black dots plot out the graph of net migration. Both quantities add up to the total net change shown as the white curve. It seems to fit the observed values satisfactorily.

As the next step we determine the parameters of Eq. (2) for 1860. The march of this curve is shown in Figure 5. It obeys the equation

$$y = 990 \tanh (0.16 P) \quad (3)$$

In this case the insignificance of migration is conspicuous because the equation has no sinh component. Therefore the total net change must have been practically entirely dependent on the excess of births, i.e. the natural increase. It is a known fact that a legal change of domicile was in those times next to impossible and almost non-existent for the lowest strata of the coeval social system.

It is true that rapidity of growth displays a marked weakening at the periphery, although it did not cease altogether, not to speak

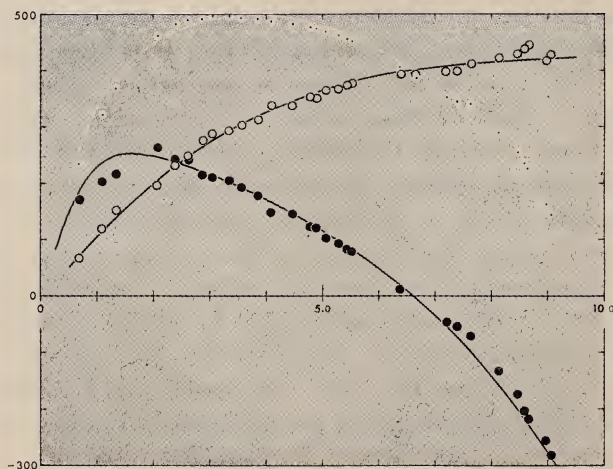


Fig. 4. The total net change (white) and its components: the excess births (open circles) and the net migration (black dots), as functions of population, 1960.

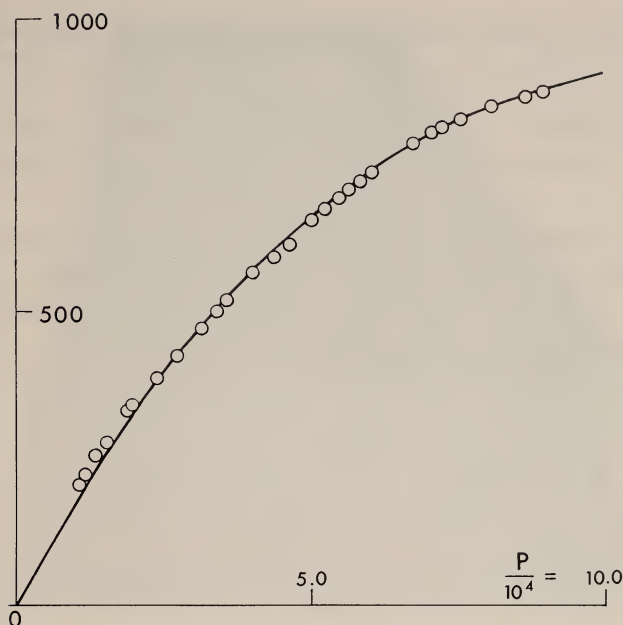


Fig. 5. The total net change in terms of population, in 1860.

of its turning to the negative side. In the next few decades, however, a downward turn came into the picture. It also came to stay, and to increase in power. The pertinent parameters prove this clearly.

DYNAMICS OF GROWTH

Considering the annual accretion it certainly concentrates attention on the form the curve displays, thereby providing some insight into the demographic processes going on in the population. However, it leaves the spectator with the feeling that some perspective is needed. Consequently, a third dimension must be included. In a presentation without space variables, the third dimension will be time.

The annual accretion may keep its coordinates. Time variation is given the third dimension on which the chosen time levels are represented as contours. In this way we can inspect formal changes in annual accretion over a long period of time. Figure 6 gives an idea of this. It gives us a reliable insight into the dynamics of population change.

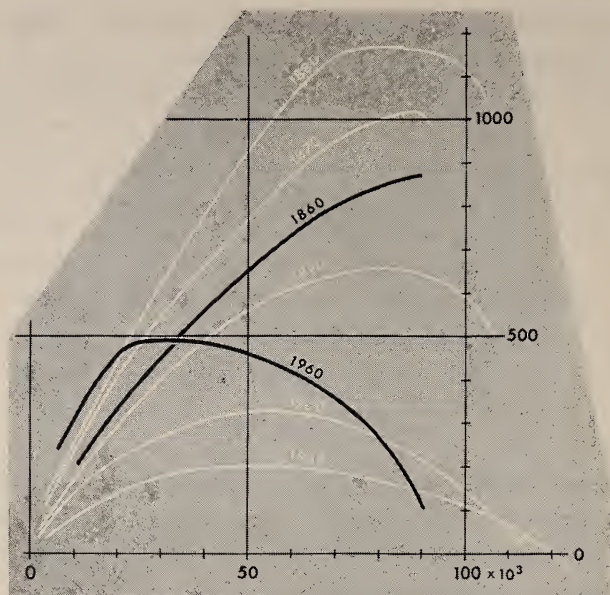


Fig. 6. Time contours of annual accretion, 1860—1960.

It will be tempting to consider the dynamic features of population development revealed through this analysis in the light of socio-economic history. A comparison of theoretical general features with historical realities must be fruitful and mutually stimulating. An attempt in this direction will be made at the end of this paper.

REGION FORMATION

Up to this point the attention has been focused on rural population. Now rurality requirements are relieved with a view to pointing out functional aggregates of communes. Instead of collecting under the same heading wildly inconsistent elements which only happen to have the decisive quality, it is now required that the group to be considered shall possess internal coherence arising from unifying relationship, interest or action.

This other individuating principle is so important that its subjects are given a special term, the *region*. The most common region generator is a supralocal service centre, i.e. a central place.

A central place creates on its site a higher level of socio-economic potential. The potential difference acts upon the people of the region as a *stimulus* or exitation whose strength varies with the distance from the centre. In the subject population the stimulus calls forth a characteristic *response* i.e. in the form of changing population numerals.

Further, in a population element, the responses become the more frequent the greater the potency of the stimulus. Therefore the rate of total change, y' , is an immediate expression for the magnitude of the response. More than this, it is, as a space phenomenon, of course a direct measure of the field strength. As such, it also measures the strength of the stimulus proper.

To exemplify the conditions within a region, we are now going to look for a region giving the maximum possible observed data. This requirement is met by the region centred on the town of Vaasa

Table 2. 1960 Population and its total net change in the communes common to Vaasa Region and the area shown in Figure 1. Source: Official Statistics of Finland, VI A:119, Helsinki 1962.

Commune v. Fig. 1	Population	Total net change
D + 17	52153	+ 749
20	3029	— 3
16	2963	— 17
18	1777	— 6
21	3849	— 6
15	1221	— 20
14	5506	— 37
19	651	— 9
23	1561	— 5
26	2213	— 7
13	3334	— 37
24	3443	— 63
22	719	— 18
25	2264	+ 8
27	8496	— 47
E	1650	+ 2
28	1130	— 3
	95843	+ 481

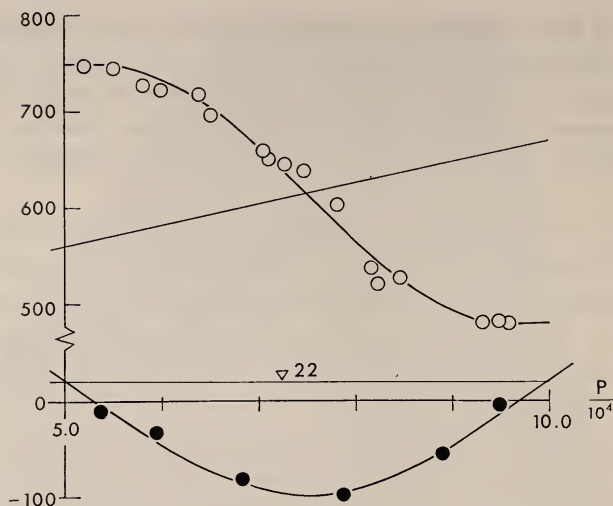


Fig. 7. Rate of total net change (black dots) and its integral curve (open circles), as functions of population, in the communes common to Vaasa Region and the area shown in Figure 1, 1960.

(marked *D* in Figure 1). Part of this region extends over the eastern boundary of the study area.

The communes concerned are listed and collected into classes in order of their increasing distance from the centre. Completed with the pertinent statistics, the list is given as Table 2.

Because of its importance the quantity y' will be considered first. Its finite difference approximations are calculated from the data pooled into classes big enough to suppress violent oscillations of values to be plotted on the class-centra, v. Table 2. Figure 7 shows the plotted values (black dots) and the curve fitted to them. For the last mentioned we may write

$$y' = 22 - 120 \sin (0.63 P) \quad (4)$$

Being in possession of the necessary statistics, we also plot the y values in the same way as in constructing Curve 1 in Figure 2. This time the observed values are represented as the open circles shown in Figure 7. For the theoretical values we have, on integrating and determining the arbitrary constant from the end condition $y_0 = 749$,

$$y = 559 + 22 P + 190 \cos (0.63 P) \quad (5)$$

The graph of this expression is also shown in Figure 7. An examination shows that the fit is quite satisfactory.

The last two equations differ only in form. In substance they refer to the same dependence of y on P . The agreement between observation and the said equations forms double evidence that the formal dependence presented is the uniting relationship which gives the necessary internal coherence to the region under discussion.

Moreover, these equations indicate that moving from the originally rural problem setting into the realm of functional regions results in a change from hyperbolic to trigonometric functions. The latter are old friends from studies concerning regions created and governed by economic, traffic and demographic considerations (Ajo, var. 1953—65).

Furthermore, special attention must be drawn to the fact that the last equation is exactly the same in form as the expressions met with in connection with the studies referred to.

REGIONS OF TRAFFIC

By now, it is time to ask what will happen if the space coordinates are included? — The answer is found out by trial.

For simplicity, only one space dimension, that is the distance from the centre, will be considered.

Live distance is a strong spatial organizing agent. It acts through the intermediary of traffic, which is to be understood in the broad

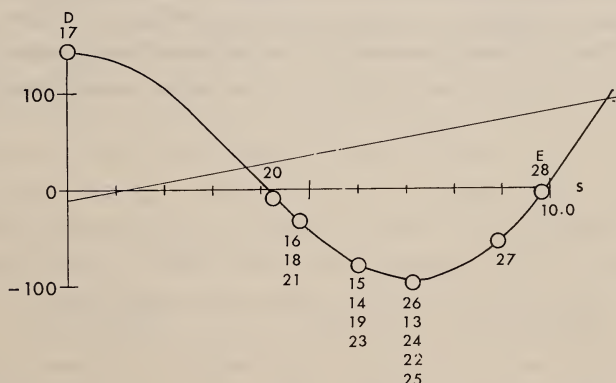


Fig. 8. Vaasa Traffic Region, 1930. Abscissae: positive square root of kilometric distance from Vaasa.

sense of that word. It must, however, be pointed out that effective distance is not the same as geometrical distance. Neither can it be identified with geographical distance. Nor can it be assumed that physical distance could have an effect proportional say, to the number of kilometres intervening, whether this figure is given as the crow flies or along a regular line of passage. It certainly does not; it has been tested.

A suitable transformation of the distance can, however, lead to results. The positive square-root of distance is chosen to this end. We thus put $x = + (r)^{1/2}$.

Concerning class frequencies, the same may be repeated as was said in the previous section. In addition, it is worth noting that a given distance may concern several surface elements which certainly induce a pooling of areal elements. So much for the independent variable.

As to the dependent variable, former experience is again consulted. It advises choosing the rate of total net increase in population. Table 2 gives the coordinates to be plotted, and Figure 8 shows that the graph of

$$y_T = -10 + 9.0 x + 150 \cos (0.42 x) \quad (6)$$

gives a rather close fit to the data. It also confirms that the constitutive relation in this kind of region is a function of central distance. More strictly speaking, it is a function comprising two components, one linear and the other trigonometric. As was already mentioned, it is the form familiar from many previous studies.

From the conventional map of Figure 1 this paper set out developing ideas in diagrams without space-coordinates. The graph just considered had a one-dimensional transformed coordinate. Our last graph, Figure 9, returns through an inverse transformation to the

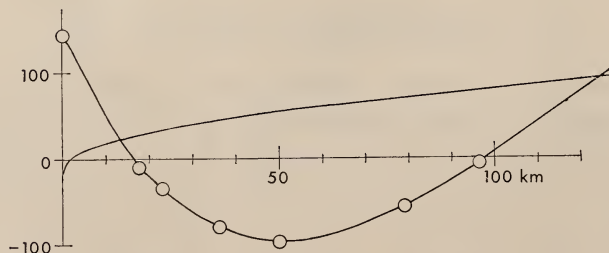


Fig. 9. Linear distance transform of Figure 8.

geographers' *terra firma* with a linear distance coordinate graduated in kilometres.

The graph does not require many comments. It can be seen that the zero intercept is the only observed point on the positive side. All other points tell of negative growth, i.e. diminution, which is greatest at about 50 km from the centre. Both zeros of the presented curve locate the zero contours. These could be transferred onto the map in Figure 1.

HISTORICAL COMMENTS ON THE TIME-CONTOURS

It cannot be denied that the curves in Figure 6 form a kind of time-series of snapshots which most certainly reflect the conditions of their times. There is no doubt, either, that the changes in the form of the curves can best be explained by the events of coeval history. The set of curves and the facts of historical reality need only be placed together and examined. A comparison in this setting results in mutual advantage, while the demographic changes become competently interpreted, and the historical records become more vivid through the additional dimension they seem to obtain in the juxtaposition with quantities. To be more concrete, an example is taken by stating some instances of history synchronous with the first decades of the century here considered.

During the period when migration was still slight and when movement of the working class, in particular, was hampered by legislative and other means, the net annual changes in population might be satisfactorily illustrated with the aid of a curve representing only the excess births. An example of this is the 1860 curve (Fig. 6). It was only after this date that a more liberal trend began to win ground in the administration of the then Finnish Grand Duchy.

The number of poor and rootless in the population had by then risen greatly, a trend which had been a particular wish of the previous century, since these people were the "strength of the nation". The contemporary social and legal system meant that the landowners were practically speaking the only employers in the countryside. The landless workers were thus economically and in civil law largely dependent on their landowners; they were almost forced to have recourse to them.

They could support themselves on daily work from the landowner only in the summer. In the winter they were supported by poor relief. "It was illustrative of the times", says the Central Office of Statistics' report for 1871—75. "The communes in this way supported a working force for the landowners to utilize. In winter poor relief substituted for the low daily rates of summer" (1879 p. 88).

Even in the 1873 Diet it was suggested in the Estate of the Peasants that a runaway worker be put in prison and that anyone who took in such a fugitive be fined 500 mk. This was at a time when the natural rise in population was faster throughout the country than it had ever been before, as far as we know; whereas between 1840 and 1865 it was 9.8 per mille of the population, it was 15.9 per mille in 1875.

Improvements in medical and economic conditions played a great part in the fast rise in population. An example of the economic factors involved is that the world market price for timber which rose in the 1870s, led to the foundation of sawmills and a lively demand for forest. Forest was sold, and the newly affluent landowners could at one blow pay off all their debts and still have so much money left that they were puzzled as to how best to invest it (*ibid.* p. 15).

The new felling, floating and rafting work, actual sawmills and loading work needed plenty of labour. Wages and the prices of food of course rose. Agriculture, too, began to improve, livestock breeding became more widespread and dairies were founded. Grass began to be sown for hay and new types of ploughs, mowing machines and harvesters began to appear in the fields. At the same time tar distilling and cultivation by burning-over began to decrease and even disappear altogether in places.

All this meant changes in the structure and distribution of agriculture. Since technological development changed the social and geographical distribution of the labour demand, the result was of course various tensions, which had to break loose in the form of migration. The faster rise in population produced by better living standards only increased tensions. The interests of the new industries and of agriculture conflicted strongly. Neither cared about the interests of the worker.

Things were still so at the beginning of the 1870s, but finally the farmers had to give way. In 1879 statutes were issued on poor relief and employment. By the end of the century these were playing an important part in the tremendous increase in migration, which had

earlier been insignificant. In populations statistics migration was such a new phenomenon that no account was kept of it until 1878, but since then the official Finnish statistics office has published in-coming and out-going figures.

Thus migration became an officially recognised fact. But movement did not gain complete freedom until 1883, when the Vagrancy Statute abolished compulsory service.

Moves, particularly into towns, then increased so fast that in places migration formed a considerably more powerful element than excess births. In the 1880s the stream of movement found a new channel in emigration. This was almost entirely to North America. The motive force of all moving was a striving for better conditions.

CONCLUSION

If we now examine the picture (Fig. 6) given by statistical analysis of the change in the annual accretion of population in the light of the above brief historical survey, it is easy to understand the rise in population in 1870 compared with the 1860 figures and the even greater rise in 1880.

When the worst obstacles to migration were removed, the result finds reflection in the fact that the 1880 curve is the peak value for annual growth. The labour force tied down to the countryside then began to burst out and with those who moved at their best procreative age a relatively large proportion of the sexual energy and thus latent population increase also disappeared. The effect thus shows rather more in the records, and this also explains the great drop in the 1890 curve compared with that for 1880.

This alone indicates that the quantitative method is really able to bring out the features which on the one hand explain and on the other draw attention to factors which require explanation. Understanding of the dynamics of history gains an added dimension. It is still more important from the point of view of making prognoses and of planning in general, however.

The quantitative region concept has in the above proved a powerful tool in the definition of many kinds of human geographical entities.

KULTURGEOGRAPHISCHE DIVERGENZEN IM LANDSCHAFTSBILDE HISPANIOLAS

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Seiner Grösse und seiner Einwohnerzahl nach steht Hispaniola hinter Kuba an zweiter Stelle unter den Inseln der Antillen. Von der kleinen Insel St. Martin abgesehen, in die sich Frankreich und die Niederlande teilen, ist Hispaniola die einzige westindische Insel, die politisch zweigeteilt ist. Sie gliedert sich in einen westlichen, haitianischen, und in einen östlichen, dominikanischen Teil, von denen der erstere kleiner und dichter bevölkert, der letztere grösser und weniger bevölkert ist (Tab. 1). Zu diesen Verschiedenheiten kommen zahlreiche Divergenzen im Bilde der Kulturlandschaft, deren Untersuchung für den Geographen einen besonderen Reiz besitzt, weil die physische Ausstattung der Insel in ihren beiden Teilen weitgehend übereinstimmt.

Tabelle 1. Fläche und Bevölkerung Hispaniolas 1960.

	Fläche in km ²	Bevölkerung in 1 000	Bevölkerungsdichte Ew/km ²
Haiti	27 750	3 505	126
Dominikanische Republik	48 734	3 014	61
Hispaniola	76 484	6 519	85

NATURAUSSTATTUNG

Hispaniola besitzt ein ausgesprochen gebirgiges Relief. Vier einander parallele Gebirgszüge, die die Insel von W nach E resp. von

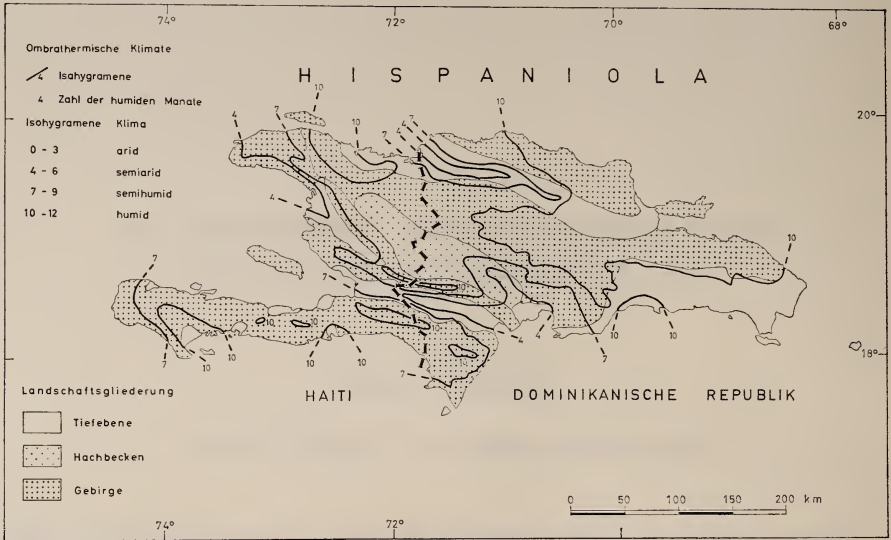


Abb. 1. Landschaftsgliederung und ombrothermische Klimate Hispaniolas.

WNW nach ESE durchziehen und durch Längsfurchen voneinander getrennt werden, bestimmen das Oberflächenbild. An die Cordillera Septentrional schliesst sich im S die nördliche Längsfurche mit der Plaine du Nord und dem Cibao an. Es folgt die Hauptkordillere, zu der das Nordwesthaitianische Bergland, das Massif du Nord und die im Pico Duarte bis 3175 m aufsteigende Cordillera Central gehören, im S begrenzt durch die von Plateau Central, Valle de San Juan und der Küstenebene von Azua gebildete Längsfurche. Den dritten Gebirgszug bilden das im einzelnen stark gegliederte Mittelhaitianische Bergland und die Sierra de Neiba. Die südliche Längsfurche, d.h. Cul-de-Sac-Ebene und die bis zu -44 m tief gelegene Enriquillo-Senke werden von der Südkordillere begrenzt, die in die Massive de la Hotte und de la Selle sowie in die Sierra de Baoruco zerfällt. Beide Staaten der Insel Hispaniola haben, abgesehen von der Cordillera Septentrional, Anteil an allen Grosslandschaften der Insel.

Der auf die alpinotype Faltung des amerikanischen Kordilleren-systems und auf spättertiäre Bruchtektonik zurückzuführende Gebirgs-charakter Hispaniolas mit seiner starken Reliefenergie hat auf der im randtropischen Passatbereich gelegenen Insel eine starke klimatische Differenzierung zur Folge. Auf keiner anderen westindischen Insel ist

die Variationsbreite der ombrothermischen Klimate so gross wie auf Hispaniola. Sowohl die luv- und leeseitige Lage zum Passat als auch die thermische Höhenstufung bewirken beträchtliche Unterschiede der Humidität. Orographisch bedingt zeigen die Stationen Hispaniolas nach dem Index *de Martonne-Lauer* zwischen 3 und 12, nach dem Index *Reichel* 0—12 humide Monate. Dass sich der Übergang vom ariden zum humiden Bereich überall auf nur kurze Entfernung vollzieht, erklärt sich gleichfalls durch die starke Reliefenergie der Insel. Beide Inselrepubliken haben an allen auf Hispaniola ausgebildeten ombrothermischen Klimatypen Anteil, ebenso an allen klimatisch bedingten Vegetationsformationen (Abb. 1 und Tab. 2).

Tabelle 2. Natürliche Grosslandschaften Hispaniolas.

Relieftyp	Klimatyp ¹	Vegetationsformation	Landschaftsbezeichnung
Tiefebene	arid	Halbwüste, Sukkulenten- und Dornsavanne, regengrüne Dorn- und Trockenwälder	westlicher Cibao, Nordküste des Golfes von Gonave, Küstenebene von Azua, Cul-de-Sac- und Enriquillo-Ebene
	semihumid	regengrüne Trocken- und Feuchtwälder, Savannen	Plaine du Nord, Küstenebene östlich von Santo Domingo
	humid	immergrüner ombrophiler Regenwald	östlicher Cibao (Vega Real), Plaine des Cayes
Hochbecken	semiarid	regengrüner Trockenwald, Trockensavanne regengrüner	Valle de San Juan
	semihumid	Feuchtwald, Feuchtsavanne	Plateau Central, Valle de San Juan
Gebirgsland	humid	immergrüner ombrophiler Regenwald, immergrüner und (semihumid) regengrüner Bergwald	sämtliche Gebirge

¹ arid:	300— 750 mm Jahresniederschlag,	— 3 humide Monate
semiarid:	750—1 250 mm	4— 6 „ „
semihumid:	1 250—2 000 mm	7— 9 „ „
humid:	über 2 000 mm	10—12 „ „

HISTORISCHE GRUNDLAGEN

Divergenzen im Bilde der Kulturlandschaft entwickelten sich erst, nachdem die Europäer auf der Insel Fuss gefasst hatten. Vor der Entdeckung durch Kolumbus (1492) war die indianische Kulturlandschaft, den Unterschieden der Naturausstattung entsprechend, zwar differenziert, aber es bestanden keine Gegensätze zwischen östlichem und westlichem Inselteil. Menschenleer waren die Gebirge, bevölkert die Ebenen mit einer blühenden Kulturlandschaft besonders in deren (semi)-humiden Abschnitten, beispielsweise der Plaine des Cayes und vor allem im östlichen Cibao (Vega Real). Auch die ersten Jahrzehnte der Kolonisation führten insofern nicht zu Divergenzen der Kulturlandschaft, als die Spanier auf der ganzen Insel Stadtgründungen vornahmen, nach Edelmetallen suchten und die Indianer überall nahezu vollständig dezimierten. Immerhin lag das Schwergewicht der spanischen Kolonisation in der östlichen Inselhälfte, um das 1496 gegründete Santo Domingo, wo vorübergehend Zuckerrohrplantagen bestanden, und in der Vega Real. Der westliche Inselteil wurde ganz entvölkert, als um 1520 die Goldförderung keinen Ertrag mehr brachte, sich das spanische Interesse der Tierra firme zuwandte und die Spanier in grosser Zahl die Insel verliessen. Dieses Niemandsland im Westen Hispaniolas erfuhr vom Ende des 16. Jahrhunderts an eine neue Inwertsetzung, indem es von französischen Bukaniern auf der Jagd nach verwilderten Rindern und Schweinen durchstreift wurde, indem sich an vielen Stellen des Innern bäuerliche Siedler (Habitants) niederliessen und diese beiden Gruppen die französischen Flibustier, die an den Küsten ihre Schlupfwinkel hatten, mit Nahrungsmitteln versorgten. Nachdem Spanien 1697 im Verträge von Rijswijk den Westteil der Insel als französischen Kolonialbesitz (St. Domingue) anerkannt hatte, nahm die Herausbildung kulturlandschaftlicher Divergenzen in verstärktem Masse ihren Fortgang.

Während das spanische Santo Domingo im 18. Jahrhundert eine von der Krone vernachlässigte Kolonie war, schwach bevölkert, im wesentlichen nur durch extensive Weidewirtschaft geprägt, nahm das französische St. Domingue einen steilen wirtschaftlichen Aufstieg. Auf der Grundlage einer bedeutenden Einwanderung aus Frankreich, vor allem aber grosser Sklavenimporte, wurde es eine blühende Plantagenkolonie, die Zucker, Kaffee und Baumwolle in reicher Menge ins Mutterland lieferte; ihre Bevölkerung wuchs von 8 000 Menschen im Jahre

1687 auf 523 800 im Jahre 1789 an, während demgegenüber Santo Domingo stagnierte und am Ende des 18. Jahrhunderts nur 100—125 000 Einwohner hatte.

Gehen wesentliche kulturgeographische Divergenzen der Gegenwart auf die unterschiedliche Wirtschaftsentwicklung der beiden Inselteile in der Zeit bis zum Ende des 18. Jahrhunderts zurück, so sind andererseits manche nicht minder wesentliche divergierende Züge des heutigen Landschaftsbildes durch die historischen und wirtschaftlichen Entwicklungen des 19. Jahrhunderts bedingt. Entscheidend war für den westlichen Inselteil die durch den Aufstand der haitianischen Neger verursachte Vernichtung der französischen Plantagenwirtschaft, an deren Stelle seit der Unabhängigkeit Haitis im Jahre 1804 in zunehmendem Masse kleinbäuerliche Landwirtschaft trat bei gleichzeitiger Verlagerung des Schwergewichtes der agraren Produktion von den Ebenen in die Gebirge hinein. In der Dominikanischen Republik, die erst 1865 ihre Unabhängigkeit von der spanischen Krone erhielt, nachdem ihr Staatsgebiet zweimal von Haiti besetzt worden war, setzte nach 1875 mit dem Einströmen von US-Kapital eine moderne Wirtschaftsentwicklung ein. Es kam, in ähnlicher Weise wie etwa zur gleichen Zeit auf Kuba und Puerto Rico, zur Bildung von Latifundien, die in Monokultur Zuckerrohr anbauen und in grossen Zentralen Zucker produzieren.

Ohne die Kenntnis dieser wichtigsten Tatsachen der politischen und wirtschaftlichen Entwicklung der Vergangenheit sind die jedem Besucher der Insel ins Auge springenden, bemerkenswerten kulturgeographischen Divergenzen der Gegenwart nicht verständlich; sie sollen, soweit sie Bevölkerung, Siedlung und Wirtschaft betreffen, im folgenden kurz erläutert werden.

KULTURGEOGRAPHISCHE DIVERGENZEN

Bevölkerung und Siedlung. Während Haitis Bevölkerung sich zu 95 % aus Negern und zu 5 % aus Mulatten zusammensetzt, fühlt sich die Bevölkerung der Dominikanischen Republik als weiss, obwohl mit 11 % Negern und 60 % Mulatten auch dort der negroide Einschlag beträchtlich ist. Dieser geht, ebenso wie die traditionelle Feindschaft zwischen den Einwohnern beider Staaten, im wesentlichen auf die zweimalige Okkupation des dominikanischen Staatsgebietes durch Haiti und auf ein in der Vergangenheit unkontrolliertes Einsickern

haitianischer Neger aus ihrer übevölkerten Heimat in die nur dünn besiedelte Dominikanische Republik zurück.

Die Negerbevölkerung Haitis erklärt sich aus der Plantagenwirtschaft der französischen Kolonialherrschaft, die sich auf afrikanische Sklaven stützte. Die Vernichtung des weissen Bevölkerungsteiles in der haitianischen Revolution hatte zur Folge, dass afrikanisches Kultur- und Sprachgut weit stärker ausgeprägt sind als in den übrigen alten Plantagegebieten des französischen und englischen Kulturraumes in Westindien. Dadurch nimmt Haiti mit der rassischen Gliederung seiner Bevölkerung innerhalb des französischen Kulturraumes der Antillen eine besondere Stellung ein, so wie das auch für die Dominikanische Republik gilt, die sich innerhalb des spanischen Kulturraumes von Kuba und Puerto Rico durch den stärkeren negroiden Einfluss unterscheidet.

Neben der Verschiedenheit ihrer rassischen Gliederung und ihrer Zugehörigkeit zu verschiedenen Kolonialreichen in der Vergangenheit und daraus resultierend zu verschiedenen Kulturräumen in der Gegenwart ist die unterschiedliche Bevölkerungsdichte in den beiden Inselteilen eine weitere auffällige Divergenz Hispaniolas (Tab. 1). Haiti kann im Hinblick auf seinen Gebirgscharakter, die kaum noch ausweitbare landwirtschaftliche Nutzfläche und die allein auf Anbau sich stützende Wirtschaft mit 540 Menschen pro km² landwirtschaftlicher Nutzfläche als übevölkert gelten, während in der Dominikanischen Republik bei 230 Einwohnern pro km² landwirtschaftlicher Nutzfläche potentiell Siedlungsland noch zur Verfügung steht, und zwar in solchem Masse, dass in der Zeit der Trujillo-Diktatur (1930—1961) eine aktive Binnenkolonisation betrieben wurde. Die zum Teil auch mit ausländischen Kolonisten eingerichteten bäuerlichen Neusiedlungen wurden, um dem starken Anstieg der Bevölkerungsdichte entlang der Grenze zum benachbarten Haiti zu mindern und um das Einsickern haitianischer Neger zu verhindern, in besonderem Masse entlang der Staatsgrenze im Zuge der *Dominicación fronteriza* angelegt. Nicht unbeträchtliche Areale der durch Binnenkolonisation gewonnenen Kulturlandflächen wurden allerdings nach 1961, als mit dem Ende der Trujillo-Diktatur der staatlicherseits auf die Kolonisten ausgeübte Druck fortfiel, wieder aufgegeben. In einzelnen Abschnitten ist daher die Staatsgrenze auf Hispaniola zugleich eine scharf ausgeprägte kulturlandschaftliche Grenze, die dicht besiedelte und in kleinen Parzellen bebaute Flächen auf der haitianischen Seite von menschenarmen, landwirt-

schaftlich nicht genutzten Flächen auf der dominikanischen Seite scheidet.

Ein weiterer wesentlicher Unterschied der Bevölkerung zwischen den beiden Inselteilen besteht darin, dass in der Dominikanischen Republik ein sehr viel grösserer Prozentsatz in Städten lebt als in Haiti. In der Dominikanischen Republik wohnen (1960) 700 500 Menschen, d.i. 27 %, in 16 Städten über 10 000 Einwohner, in Haiti (1950)¹ nur 196 000 in 5 Städten, d.i. 6 %. Die haitianische Hauptstadt Port-au-Prince beherbergt mit (1950) 135 700 Einwohnern 4 %, die dominikanische mit (1960) 367 100 Menschen 12 % der gesamten Bevölkerung. Selbst wenn man in Haiti Siedlungen von mehr als 1000 Einwohnern als städtisch bezeichnen wollte, könnte nicht mehr als 11 % der Gesamtbevölkerung als städtisch klassifiziert werden. Demgegenüber erreicht der Anteil der städtischen Bevölkerung in der Dominikanischen Republik (1960) 31 %. Die auch in der Vergangenheit grössere Verstädterung in der Dominikanischen Republik ist zweifellos ein Erbe der spanischen Kolonisation, in ihr drückt sich aber auch die gegenüber Haiti fortgeschrittenere wirtschaftliche Entwicklung aus. Diese kann auch aus dem starken Rückgang des Analphabetentums erschlossen werden, das von 75 % im Jahre 1930 auf 27 % 1960 zurückgegangen ist, während in Haiti noch immer 90 % der Bevölkerung Analphabeten sind.

Bezüglich des Siedlungsbildes ist die grössere Zahl von Städten in der Dominikanischen Republik nicht der einzige Unterschied zwischen beiden Inselteilen, vielmehr zeigen vor allem die ländlichen Siedlungen auffallende Verschiedenheiten. So überwiegt in Haiti die extreme Streusiedlung, in der Dominikanischen Republik ist diese hingegen nur im Bereich der Conuqueros, d.h. in den Gebieten nicht gelenkter Rodung in den Gebirgen anzutreffen, während sonst Dorfsiedlung vorherrscht, sowohl in den bäuerlichen als auch in den plantagenmässigen Agrarlandschaften. Die Verschiedenheit des dominikanischen Bauernhauses, des vermutlich auf die indianische Bevölkerung zurückgehenden Bohío, von der Hütte des haitianischen Kleinbauern, die, wenn auch regional aus unterschiedlichen Baumaterialien errichtet, afrikanischen Ursprungs ist, sei nur am Rande vermerkt.

Agrarwirtschaft. Die Betriebsgrössen der dominikanischen und haitianischen Landwirtschaft divergieren beträchtlich. Haiti ist ein Land

¹ 1950 fand die erste und bisher einzige Volkszählung statt.

von Kleinbauern. Nur 7 % der landwirtschaftlichen Nutzfläche (750 000 ha) nehmen Grossbetriebe ein, die — durchweg in ausländischem Besitz — überwiegend während der amerikanischen Besatzung 1915—1934 entstanden. Die übrigen 600 000 ha werden von Kleinbetrieben bewirtschaftet, die zu 70 % unter 2 Carreaux (2,6 ha) und zu 98 % unter 20 Carreaux (25,7 ha) gross sind. Demgegenüber befindet sich nahezu die Hälfte der landwirtschaftlichen Betriebs- bzw. Nutzfläche, von denen letztere mit 1,3 Mill. ha doppelt so gross ist wie in Haiti, in der Dominikanischen Republik im Besitz von Grossbetrieben (über 100 ha). Die Grossbetriebe machen aber nur 0,7 % der Zahl der Betriebe aus.

Die Unterschiede der Agrarsozialstruktur und der Betriebsformen drücken sich im Bilde der Agrarlandschaft deutlich aus. Der exportorientierte Anbau der Grossbetriebe nimmt in den Ebenen der Dominikanischen Republik riesige Areale ein, aber nur kleine Flächen in Haiti. Die für die Grossbetriebe charakteristische Monokultur ist daher in der Dominikanischen Republik weit verbreitet, in Haiti dagegen ist es die bäuerliche Polykultur. Die agrare Produktion stammt in Haiti in der Hauptsache von bäuerlichen Betrieben im Gebirgsland, in der Dominikanischen Republik von Grossbetrieben in den Ebenen.

Es gibt kaum einen grösseren Gegensatz in Bild und Gefüge der Wirtschaftslandschaft von Hispaniola als den zwischen den Kulturflächen der in der Dominikanischen Republik weitverbreiteten Latifundien und den in Haiti dominierenden, mit Baumkulturen, im Feldbau oder mit beidem genutzten Parzellen kleinbäuerlicher Polykultur. Durch das völlig regellose Nebeneinander der Kulturpflanzen und die verstreute Lage der Parzellen sowie durch deren Kleinheit unterscheidet sich die haitianische bäuerliche Kulturlandschaft wesentlich auch von den dominikanischen Bauernwirtschaftslandschaften, in denen nicht nur in den neuen Kolonistensiedlungen, sondern auch in altem bäuerlichem Siedlungsland wie z.B. in der Vega Real, trotz Polykultur die regelmässige Bebauung der Felder, die regelmässige Anlage auch der Baumkulturen, die grössere Sorgfalt im Anbau sowie die Geschlossenheit der Feldfluren, d.h. ein durchaus wesensverschiedenes Wirtschaftsflächenbild ins Auge fällt.

Nur eine Wirtschaftslandschaft der Monokultur, die des Sisalanbaus in Grossbetrieben besitzt in Haiti grössere Ausdehnung als in der Dominikanischen Republik. Demgegenüber ist die Verbreitung der Zuckerrohrmonokultur in der Dominikanischen Republik um ein Vielfaches

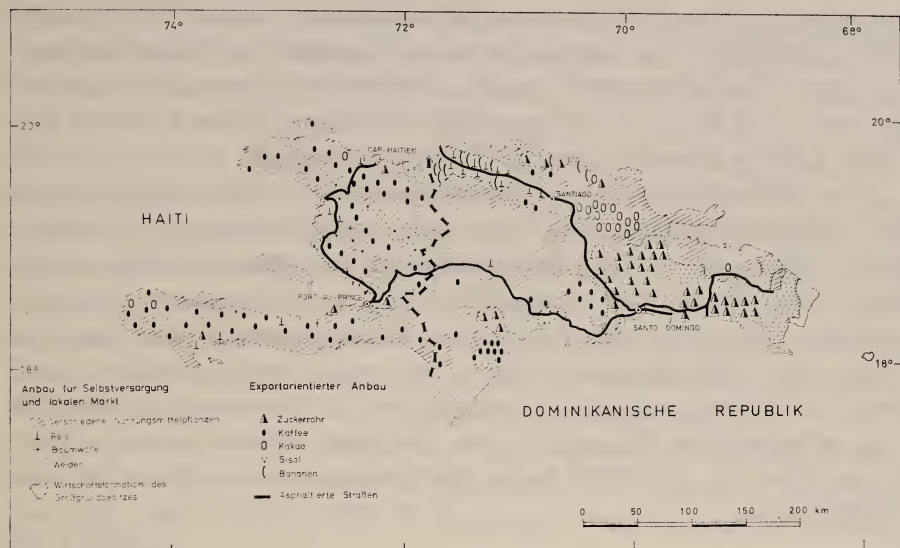


Abb. 2. Landnutzung auf Hispaniola.

grösser als in Haiti, und die Wirtschaftslandschaft der Bananenmonokultur ist in Haiti überhaupt nicht vertreten. Die Wirtschaftslandschaft der Weidewirtschaft hat in der Dominikanischen Republik relativ grosse, in Haiti dagegen nur sehr geringe Verbreitung. In Haiti überwiegen eindeutig die Wirtschaftslandschaften bäuerlicher Polykultur, die in der Dominikanischen Republik entschieden zurücktreten.

Die agrare Produktion der Dominikanischen Republik deckt den Nahrungsmittelbedarf der Bevölkerung weit stärker als die haitianische Produktion. Ausserdem ist die dominikanische Produktion weit mehr exportorientiert als die haitianische und übertrifft diese um ein Vielfaches (Tab. 3).

Tabelle 3. Exportorientierte agrare Produktion Hispaniolas in 1000 t (Mittel der Jahre 1958—1962).

	Zucker	Kaffee	Kakao
Haiti	58,8	30,2	2,2
Dominikanische Republik	906,8	34,0	35,8

Ein bemerkenswerter Unterschied zwischen den beiden Inselteilen besteht auch darin, dass die dominikanische agrare Produktion heute

diejenige der Kolonialzeit wesentlich übersteigt, während in Haiti die agrare Produktion bei weitem nicht an diejenige vom Ende der französischen Kolonialherrschaft im 18. Jahrhundert heranreicht. So werden nur ca. 15 000 t Zucker gegenüber 71 000 t im Jahre 1789 und nur 30 000 t Kaffee gegenüber damals 38 500 t produziert.

Eine Modernisierung der Landwirtschaft ist in Haiti, abgesehen von den wenigen Grossbetrieben, noch kaum zu beobachten. In viel stärkerem Masse als in der Dominikanischen Republik wird der bäuerliche Anbau durch rückständige Methoden und Ertragsarmut gekennzeichnet. Viele der kolonialzeitlichen Bewässerungsanlagen sind verfallen. Zum Teil allerdings wurden, wie in der Artibonite-Ebene, neue Irrigationsflächen geschaffen. Doch nimmt die Bewässerung, ohne die eine ackerbauliche Nutzung in den trockenen Ebenen nicht möglich ist, in Haiti nur ca. 78 000 ha, in der Dominikanischen Republik aber 135 000 ha ein.

Industrie. Das wirtschaftliche Gefälle, das heute von der Dominikanischen Republik gegen Haiti besteht und sich somit gegenüber der Kolonialzeit umgekehrt hat, zeigt sich nicht nur in der Agrarwirtschaft, sondern auch in der Industrie. In Haiti sind bislang nur äusserst bescheidene Anfänge einer Industrialisierung zu beobachten, während in der Dominikanischen Republik die Industrialisierung schon über das Anfangsstadium hinausgewachsen ist. Nicht einmal 10 000 Menschen sind in Haiti, nahezu 90 000 Menschen in der Dominikanischen Republik in der Industrie beschäftigt. In Haiti ist Port-au-Prince der einzige Industriestandort, abgesehen von der Sisalaufbereitung in der nördlichen Küstenebene und von der Zuckerherstellung in zwei kleinen Fabriken bei Cap-Haitien im Norden und Les Cayes im S. In der Hauptstadt sind eine Zuckerfabrik und eine Zementfabrik die bedeutendsten industriellen Betriebe. Hinzu kommen eine Getreidemühle, sowie eine Baumwollspinnerei und -weberei. Ausserdem werden in sehr kleinen Betrieben einige wenige andere Konsumgüter hergestellt, insbesondere Schuhe, Säcke, Seife, Pharmazeutika, Getränke, Zigaretten, Pflanzenöle und Kunststoffartikel. Die Dominikanische Republik hat demgegenüber nicht nur eine vielseitigere und umfangreichere industrielle Produktion, auch ist die Zahl der Industriestandorte grösser. Es gibt 16 moderne Zuckerfabriken, von denen die in Rio Haina westlich von Santo Domingo ihrer Kapazität nach die grösste der Antillen ist. Der

Pressrückstand des Rohres, die Bagasse, wird in der Zuckerzentrale von La Romana zu Furfurol, einem Grundstoff zur Nylonherstellung, und neuerdings auch zu Papier verarbeitet. Wenn es auch in Santiago und Puerto Plata Betriebe der Konsumgüterindustrie gibt, so ist die Hauptstadt Santo Domingo doch der wichtigste Industriestandort. Die dortige Zementfabrik liefert mit 243 000 t das Vierfache der haitianischen Produktion. Neben vielseitiger Konsumgüterproduktion sind Düngemittelerzeugung und Glasherstellung relativ junge Zweige der Industrie von Santo Domingo. Als Standort für eine geplante Investitionsgüterindustrie ist der Zucker- und Eisenerzexporthafen Rio Haina vorgesehen, der ausser der grossen Zuckerzentrale bereits eine Schiffswerft besitzt und ein Gußstahlwerk erhalten soll.

Der unterschiedliche Stand der wirtschaftlichen Entwicklung spiegelt sich in den voneinander abweichenden Werten des Prokopfeinkommens, das in Haiti 1962 77 \$, in der Dominikanischen Republik 202 \$ betrug.

Voraussetzung für die Industrialisierung der Dominikanischen Republik war die Steigerung der Energieerzeugung von 15 Mill. (1937) auf 439 Mill. kWh (1962). In Haiti aber konnte die Stromerzeugung bis 1960 nur auf 59 Mill. kWh ausgebaut werden. Eine Beseitigung der Stromknappheit in der haitianischen Hauptstadt ist erst mit dem Bau des Wasserkraftwerks am Peligre-Staudamms des Artibonite zu erwarten, über dessen Bau nach jahrelangen Verhandlungen 1964 mit einer italienischen Firma ein Vertrag abgeschlossen wurde. Der unterschiedliche Industrialisierungsgrad in den beiden Staaten auf Hispaniola erklärt sich auch durch den sehr differierenden Zustand des Verkehrsnetzes.

Verkehr und Handel. Während beiden Staaten gemeinsam ist, dass Eisenbahnen keine Rolle spielen, zeigt das Strassennetz beträchtliche Unterschiede. In Haiti kommt auf 417, in der Dominikanischen Republik auf 133 Einwohner ein Kraftfahrzeug. Die Dominikanische Republik hat ca. 5 700 km Allwetterstrassen, Haiti 3 000 km Strassen, die nur zum kleinsten Teil ganzjährig befahrbar sind; selbst die Hauptstrasse von Port-au-Prince nach Cap-Haitien befindet sich in einem denkbar schlechten Zustand. Demgegenüber hat die Dominikanische Republik mit der die Zentralkordillere querenden Carretera Duarte eine hervorragende Strassenverbindung von der Hauptstadt in den zweiten

wirtschaftlichen Kernraum des Staates, in die Vega Real, und nach E und W führt aus der Hauptstadt Santo Domingo eine Autobahn entlang der Küste, nach E bis zu dem 25 km entfernten, für Düsenmaschinen angelegten, neuen Flughafen Boca Chica.

Auf Grund dieser Situation von einem Verkehrsgefälle zwischen den beiden Staaten zu sprechen wäre insofern irreführend, als es Verkehrsverbindungen über die Grenze so gut wie nicht gibt. Die Grenze ist oft für längere Zeitabschnitte gesperrt. Auch wenn das nicht der Fall ist, gibt es keinen lokalen Grenzverkehr. Von den 31 622 Besuchern der Dominikanischen Republik im Jahre 1959 benutzten bezeichnenderweise nur 33, d.h. 0,1 % den Landweg von Haiti. Beide Staaten kehren sich verkehrsmässig, bedingt durch die historischen und wirtschaftlichen Gegebenheiten, sozusagen den Rücken zu.

In der Dominikanischen Republik spielt sich der Überlandverkehr in der Personenbeförderung mit Sammeltaxis, im Güterverkehr mit Lastkraftwagen ab. Auch in Haiti hat der Lastwagenverkehr die früher lebhafteste Küstenschiffahrt sehr stark reduziert. Im Güter- und Personennahverkehr hat aber das Maultier noch kaum seine Rolle als Transporttier eingebüsst. Auch tragen die Bauersfrauen über weite Strecken hin in Körben ihre Erzeugnisse zum Markt. Das ganze Land wird von einem Netz häufig begangener Fuss- und Saumtierpfade überzogen.

Beide Staaten haben eigene Fluggesellschaften. Die haitianische Cohata bedient wie die dominikanischen Aerovias Quisqueyanas nur die Städte des Inlandes, allein die grössere dominikanische Fluggesellschaft *Compañía Dominicana de Aviación* unterhält Verbindungen ins Ausland, nach Puerto Rico, Curaçao, Venezuela und in die USA. Der Fremdenverkehr ist in beiden Staaten auf Grund der politischen Unruhen in den letzten Jahren unbedeutend gewesen; vorher besass er in Haiti grössere Bedeutung als in der Dominikanischen Republik, weil auf den amerikanischen Touristen die Negerrepublik mit der Ursprünglichkeit ihrer Menschen und deren Lebensweise weit exotischer wirkte und daher erheblich grössere Anziehungskraft besass.

Der Binnenhandel spielt in beiden Staaten eine grosse Rolle. Ein so buntes Marktleben, wie es sich in Haiti an verschiedenen Stellen fernab von Siedlungen allwöchentlich abspielt, kann man in der Dominikanischen Republik allerdings nicht beobachten. Das erklärt sich daraus, dass die Märkte in Haiti grossenteils den in extremer Streu-

siedlung in klimatisch verschieden ausgestatteten Regionen lebenden Bauern dienen. Die Bauersfrauen, die in weit grösserer Zahl als Händler die Märkte aufsuchen, tauschen die kleinen, wöchentlich anfallenden Überschussmengen ihrer Produktion gegen andere Agrarerzeugnisse ein oder kaufen vom Erlös ihrer Erzeugnisse bei Händlern die für den Haushalt benötigten Produkte, die nicht agrarer Herkunft sind.

Da die exportorientierte Produktion in der Dominikanischen Republik sehr viel grösser als in Haiti ist, übertrifft das Aussenhandelsvolumen der Dominikanischen Republik mit einem Wert von (1964) 371 Mill. \$ dasjenige von Haiti, das (1964) nur 72 Mill. \$ beträgt. Auf Grund ihrer jungen wirtschaftlichen Entwicklung ist die Dominikanische Republik weniger auf Konsumgüterimporte angewiesen als Haiti. In beiden Staaten sind die Hauptstädte dem Güterumschlag nach die wichtigsten Häfen. Sowohl Port-au-Prince als auch Santo Domingo bewältigen fast die gesamten Einfuhren, aber im Export hat die dominikanische Hauptstadt nicht die gleiche Führungsstellung wie Port-au-Prince, weil in der Dominikanischen Republik im Gegensatz zu Haiti eine ganze Reihe anderer Häfen Exportgüter verschickt.

AUSBLICK

Die kulturgeographischen Divergenzen auf Hispaniola, die in Bevölkerung und Siedlung, in Agrarwirtschaft und Industrie, in Verkehr und Handel hier nur kurz aufgeführt werden konnten, ohne Vollständigkeit anzustreben, machen deutlich, wie sehr die Inwertsetzung der Landschaft und das Bild der Kulturlandschaft bei gleichartiger physischer Ausstattung durch den Menschen von einander abweichende Prägung erfahren können. Erst nach der frühen spanischen Kolonisation haben sich östlicher und westlicher Teil der Insel Hispaniola politisch und wirtschaftlich auseinander entwickelt. Die Kulturlandschaft wandelte sich in beiden Inselteilen mehrfach, sie wandelte sich zudem in ganz verschiedener Weise. Das in der Kolonialzeit bestehende Gefälle in der wirtschaftlichen Erschliessung war von W nach E gerichtet, in der Gegenwart verläuft es in umgekehrter Richtung. Die unterschiedliche historische und wirtschaftliche Entwicklung von St. Domingue—Haiti und Santo Domingo—Dominikanische Republik erklärt die kulturgeographischen Divergenzen der Insel Hispaniola.

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L'ATLAS DE LA RÉGION PARISIENNE

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Helmer Smeds se penchait volontiers sur les problèmes cartographiques, et il se plaisait à imaginer de nouveaux signes, pour la représentation des villes, par exemple. C'est en hommage à la mémoire de cet ami très cher que je voudrais présenter ici quelques réalisations d'atlas français et particulièrement celui de la Région parisienne. Et je voudrais que ce fût aussi un hommage à la Société finlandaise de Géographie dont l'Atlas fut une révélation dans le monde géographique d'il y a un demi-siècle.

Sans parler de l'*Atlas national de la France*, trois grands Atlas régionaux étaient déjà parus en France, ceux de l'Est, du Nord, de Normandie. Mais il pouvait paraître impossible de tenter un Atlas de l'agglomération parisienne. Rien de pareil n'avait été fait pour des villes de semblables dimensions. L'agglomération parisienne compte plus de 8 millions d'habitants dont les uns se tassent à une densité de 35.000 au kilomètre carré et dont les autres se diluent dans la campagne voisine. Et elle représente à elle seule l'équivalent des 25 plus grandes agglomérations françaises en dehors d'elle. Et puis c'est sans doute la partie du territoire français où l'espace a le plus bougé. Tandis qu'ailleurs les campagnes évoluaient lentement, restant toujours un peu fidèles à elles-mêmes, que les villes continuaient à vivre au milieu de ces campagnes, l'immigration massive de gens venus de toute la France a submergé ici toutes les structures antérieures, oblige à présenter de l'agglomération parisienne un visage tout neuf.

Cette entreprise, Jacqueline Beaujeu-Garnier, professeur de Géographie à la Sorbonne, l'a tentée pourtant. Elle venait de terminer

l'Atlas du Nord de la France qui avait remporté un franc succès; et, disposant de techniques éprouvées, elle voulait rechercher le moyen de les appliquer à ce grand ensemble parisien. En étroite collaboration avec elle s'est associé à l'oeuvre Jean Bastié, professeur à la Faculté des Lettres de Paris-Nanterre, qui avait analysé minutieusement en une thèse de doctorat es-lettres la croissance d'une banlieue parisienne et qui était familier des administrations travaillant à l'aménagement de la région.

Il fallait réunir une équipe de collaborateurs capables d'assembler la masse énorme de documents, de les trier, de les exprimer cartographiquement. Ces collaborateurs ont été recrutés de façons très diverses; beaucoup d'entre eux étaient des étudiants ou d'anciens étudiants de l'Université de Paris; géographes ou cartographes. Les uns se livraient à de longues et difficiles enquêtes, maison par maison, tandis que d'autres dépouillaient les documents fournis par les administrations publiques et les entreprises privées. Sans parler des collaborateurs occasionnels au nombre d'une centaine, ce furent une vingtaine de personnes qui travaillèrent de façon continue pendant cinq ans à préparer et mettre au point les diverses cartes. Et le tout représente 200.000 heures de recherches. Le secrétariat fut assuré par une jeune docteur en géographie, Annie Delobez, qui, toujours présente et efficace, fut à côté des directeurs une cheville ouvrière de l'entreprise sous un anonymat discret.

Le deuxième problème, qui n'était pas le moins ardu, consistait à recueillir les fonds nécessaires pour financer l'opération. Il fallait convaincre les pouvoirs publics, les entreprises privées, solliciter des souscriptions. Il se rencontra heureusement, à la tête des grandes administrations, des hommes qui furent conquis par le projet et qui en comprirent la portée; et, parmi eux, il faut citer tout particulièrement le Préfet de la région parisienne, Paul Delouvrier. Des fonds considérables furent accordés par les pouvoirs publics, qui libérèrent les auteurs des soucis financiers. Et, pour coordonner le tout, une association fut créée, l'Association universitaire de recherches géographiques et cartographiques (A.U.R.E.G.) présidée par Georges Chabot.

La maison d'éditions Berger-Levrault, qui avait déjà publié *l'Atlas de l'Est* et celui de la Région du Nord se chargea du tirage et de la publication.

Rien de tout cela n'aurait été possible sans l'ardeur convaincante, la patience, le rayonnement des deux géographes qui dirigeaient l'œuvre. Les équipes d'étudiants rivalisaient de conscience auprès de tels maîtres tandis que les bailleurs de fonds étaient rassurés par la valeur et la confiance de ceux qui les sollicitaient.

Et on aboutit ainsi à cette oeuvre monumentale.¹ L'album est composé de 92 planches de grandes dimensions offrant 400 pages en couleurs; la préface en a été écrite par le Préfet Paul Delouvrier. Un volume de 961 pages l'accompagne, rassemblant les commentaires dus aux géographes les plus qualifiés et illustré de 180 croquis.

Dès le premier coup d'œil, l'ouvrage se présente comme une œuvre d'art, grâce à l'harmonie des couleurs, et certaines cartes sont particulièrement chatoyantes.

Les cartes sont à des échelles très diverses; il a été naturellement impossible d'adopter la même échelle pour toutes les cartes, à cause des différences de densités entre le centre et la périphérie; aussi les échelles varient-elles de 1/25.000 à 1/500.000 et même 1/1.000.000.

Il est impossible de donner la liste de ces 400 cartes.

8	sont consacrées à la localisation générale.
20	— aux aspects physiques.
40	— à la structure urbaine.
98	— à la population.
32	— aux transports et à l'énergie.
48	— à l'agriculture.
27	— à l'industrie.
84	— au secteur tertiaire.
31	— au rôle national et international.
1	— au Schéma d'aménagement futur.

On peut voir qu'aucun aspect de l'agglomération n'est laissé de côté, que sont évoqués toutes ses activités et tout son rayonnement. Il y a là un véritable modèle d'une géographie régionale exhaustive.

Je voudrais insister seulement sur quelques cartes particulièrement frappantes.

¹ *Atlas de Paris et de la Région parisienne*, sous la direction de Jacqueline Beaujeu-Garnier et Jean Bastié. Un vol. 67,6 x 55 cm de 92 planches en couleurs et un vol. 28 x 19 cm, de 961 p. Paris, Berger-Levrault, 1967.

Les cartes figurant la localisation de Paris dans le monde, les conditions géologiques ou hydrographiques servent en quelque sorte d'introduction.

La structure d'une ville est donnée par son plan, c'est-à-dire le tracé des rues (pl.31). Des teintes différentes marquent l'âge de ces voies dont certaines sont antérieures à la conquête romaine tandis que les dernières, tracées au XIX^e siècle, par Rambuteau et Haussmann, dominent la circulation d'aujourd'hui. Et une carte très originale montre les mobiles qui ont inspiré les divers tracés.

De même les immeubles sont classés d'après leur âge et leur type à la suite d'enquêtes menées rue par rue, îlot par îlot. Sur les 69.200 maisons d'habitation dans Paris, 77 % datent d'avant 1914, 34,6 % d'avant 1871. D'où les contrastes entre les vieux hôtels particuliers, les immeubles collectifs, les grands ensembles de la périphérie.

L'agglomération parisienne n'a cessé en effet de se développer pour aboutir à cette masse gigantesque. Le noyau ancien, antérieur à 1805, y tient bien peu de place, dans sa forme circulaire; de 1805 à 1857 la prolifération se fait en étoile; de 1857 à 1887 les vides se garnissent; de 1887 à 1908 et surtout de 1908 à 1936 l'extension dans toutes les directions forme encore une masse presque continue tandis que de 1936 à 1965 se dispersent des îlots de peuplement.

Aussi plus de la moitié du sol de l'agglomération est occupée par des habitations, individuelles ou collectives, attestant une grande concentration de l'habitat: Paris est peu étendu relativement à sa population. Mais il n'empêche que des terres labourées, des cultures maraîchères, des vergers, des herbages s'insinuent dans l'agglomération et qu'il subsiste un habitat rural.

Les activités industrielles ont été reportées en détail suivant les différentes catégories et les dimensions avec des exemples de quartiers industriels.

Pour le secteur tertiaire, on a représenté les commerces de gros et de détail, les grands magasins, et 11 cartes sont consacrées au centre des affaires avec les surfaces de planchers de bureaux, les téléscripts, les téléphones, les sièges sociaux. Ce centre est, d'ailleurs, diversifié: alimentation vers les Halles, habillement vers le Sentier, et surtout finance près de la Bourse, grandes affaires et commerce de luxe près des Champs Elysées.

40 cartes expriment les équipements divers: hôteliers, médicaux, sportifs, culturels, religieux.

La population qui s'affaire à toutes ces activités est cartographiée suivant son âge, son sexe, ses professions, ses opinions politiques, ses déplacements quotidiens.

Mais il ne suffit pas de regarder vivre cette population à l'intérieur de l'agglomération. Paris déborde largement sur toute la France.

L'industrie essaime en province, suivant un mouvement de décentralisation qui a surtout atteint les industries mécaniques et électriques et qui se situe surtout à la périphérie de la Région parisienne.

Les loisirs des Parisiens s'étalent sur toute la France, car Paris se trouve être la grande ville du monde qui se vide le plus en été (à 75 %); des cartes établies par sondages montrent les séjours de vacances à la mer, à la montagne, à la campagne. Et 300.000 maisons de plaisance sont repérées dans le Bassin parisien.

L'agglomération parisienne se ravitaille dans la France entière, en légumes, en fruits, en vins, en viande, en poisson, tandis que la France entière forme la clientèle parisienne.

L'agglomération reçoit l'électricité par un réseau qui couvre la France entière; son gaz vient des usines de l'Est, de Lacq, des Pays-Bas, ses produits pétroliers des raffineries de la Basse-Seine. Le ravitaillement en eau pose de graves problèmes qu'on ne peut résoudre sans désinfecter l'eau des rivières.

Le rayonnement intellectuel de Paris s'exprime par le nombre des établissements scientifiques, des étudiants (30 % de la France entière; le chiffre s'est abaissé ces dernières années avec la création de nouvelles Universités et l'arrivée d'étudiants plus nombreux, plus attachés à leur sol natal). Ce rayonnement s'exprime aussi par la diffusion à travers la France des anciens élèves des grandes écoles parisiennes, et on a ainsi représenté la répartition à travers le pays des élèves issus de trois grandes écoles (Polytechnique, Centrale, Hautes Etudes Commerciales).

Il faudrait ajouter l'influence des journaux, illustrée par la représentation des lecteurs du *Monde* et de *Paris-Match*.

Mais il ne suffit pas de montrer la place de Paris dans la vie française. Le rôle international est largement étudié sous plusieurs aspects.

Du point de vue industriel et commercial, on a pris l'exemple des automobiles exportées par la Régie Renault, et qui représentent 45 % de la production totale de l'entreprise en 1966. Les pays du Marché Commun forment naturellement les principaux clients; mais

tous les pays de l'Europe occidentale, particulièrement l'Espagne, participent au marché. Les ventes hors d'Europe représentent la moitié des ventes en Europe: elles se font surtout en Amérique latine et en Afrique.

Mais les exportations des Galeries Lafayette, de la parfumerie, de la Haute Couture, révèlent une influence plus spécifiquement parisienne. Elles se répartissent dans le monde entier, répondant particulièrement aux niveaux de vie élevés de certaines nations, à la similitude des civilisations. Les États-Unis jouent là un rôle primordial.

Le rayonnement intellectuel de Paris dans le monde est attesté à la fois par le nombre de ceux qui y viennent étudier et par la diffusion des publications et des tournées artistiques.

30.000 étudiants étrangers fréquentent les cours de l'Alliance française plus 14.000 inscrits dans les diverses facultés; si l'Europe occidentale et l'Amérique du Nord sont les mieux représentées, on relève des ressortissants de presque toutes les nations.

L'influence de la presse déborde largement les frontières. L'hebdomadaire *Paris-Match* connaît de grosses ventes à travers toute l'Europe (367 exemplaires vendus par semaine en Pologne) et l'Amérique du Nord. Le journal *Le Monde* représenterait, avec des effectifs moindres, une répartition semblable.

L'*Atlas de Paris et de la Région parisienne* présente donc à la fois la vie interne de l'agglomération et son rayonnement extérieur. On y saisit le rôle que peut jouer cette agglomération à travers le monde. »A la pointe du vieux monde elle est projetée à la rencontre du nouveau... Dans un rayon de 10.000 kilomètres on peut atteindre les cinq sixièmes des terres émergées habitées. Paris est un des plus grands carrefours du monde» disent les auteurs Jacqueline Beaujeu-Garnier et Jean Bastié.

L'*Atlas* en apporte la preuve sous la forme cartographique, c'est-à-dire sous la forme la plus propre à toucher l'esprit des géographes.

LA STRUCTURE DE LA GÉOGRAPHIE HUMAINE

par

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La géographie humaine a conquis son autonomie depuis maintenant près d'un siècle. L'histoire de son développement est instructive, car elle se déroule parallèlement à celle des autres sciences sociales, présente les mêmes phases et doit tenir compte comme elles de la diversité des sociétés humaines: elle étudie le genre de vie des sociétés archaïques, les régions que secrètent les sociétés intermédiaires ou les équilibres économiques qui rendent compte d'une bonne part des localisations dans les sociétés développées.

La plupart des ouvrages de géographie générale humaine se montrent incapables de surmonter les difficultés qui naissent de la multiplicité des formes de civilisation: ils se présentent plus comme des recueils de recettes que comme des ouvrages systématiques. La diversité des méthodes, l'incohérence apparente de l'ensemble sont telles que l'on peut légitimement se demander si les matières regroupées dans les manuels de géographie humaine ressortent bien toutes à la même discipline. Les tenants de la géographie régionale éludent la difficulté qu'ils sentent bien en insistant sur la nature idiographique de notre discipline: pour eux, le géographe cherche moins à découvrir les ressorts intimes d'une série de mécanismes logiquement liés qu'à dresser un tableau de combinaisons originales et jamais reproduites. De la sorte, la multiplicité des inspirations cesse d'être choquante: elle tient à ce que la géographie humaine est plus un art qu'une science; la géographie générale n'a pas de sens, puisque le propre du géographe n'est pas de chercher ce qui fait la régularité du monde, mais, au contraire, ce qui le colore si diversement.

Il y a maintenant plus d'une dizaine d'années que le point de vue exceptionnaliste qui caractérisait les travaux de la génération précédente est battu en brèche (Schaefer 1953). L'étude de la différenciation de la surface terrestre ne conduit pas seulement à la description de paysages parfaitement originaux; elle montre l'action de forces ordonnées, elle appelle une véritable géographie générale. C'est ce que l'on peut trouver de plus positif dans des ouvrages comme ceux de Bunge (1962): sa géographie théorique se propose de mettre en évidence les caractères communs à toutes les démarches de notre discipline; elle conduit à une théorie générale de l'organisation du travail géographique. Les travaux de bon nombre de géographes anglo-saxons, de Chorley et Haggett (1965, 1967) en particulier, s'inscrivent dans la même perspective.

Les publications de Bunge, de Chorley, de Haggett sont faites pour soutenir un combat — cela crée leur intérêt, mais explique aussi certaines de leurs lacunes. Ces auteurs attachent un prix tout particulier à montrer que les méthodes nouvelles qu'ils proposent s'appliquent aussi bien aux problèmes de la géographie naturelle ou physique, qu'à ceux de la géographie humaine. Ne peut-on employer les mêmes démarches pour analyser le tracé d'un réseau de rivières et celui d'un réseau routier ou ferroviaire? Ainsi répondent-ils par avance aux reproches des partisans de la géographie régionale qui estiment que la recherche générale fait éclater la géographie en disciplines spécialisées, sans parenté réelle. Mais ils négligent du même coup de préciser les rapports que nourrissent entre elles les diverses branches de notre discipline. Les modernistes passent directement d'une théorie très générale, à l'analyse de problèmes très particuliers: il manque, dans leur présentation, une pièce essentielle, la définition des articulations de la géographie.

En géographie humaine, la confusion des idées est grande. Les progrès actuels des méthodes d'analyse donnent l'espoir de voir bientôt se dégager des connaissances de portée générale. Pour les utiliser, leur donner toute leur valeur, il est nécessaire de les organiser — et donc, d'explorer les structures de cette partie de notre discipline.

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Les définitions de la géographie humaine sont multiples. Dans les pays anglo-saxons, elles mettent volontiers au premier plan le caractère écologique de la discipline: toutes celles qui sont citées par le dictionnaire des termes géographiques de Stamp (1961) sont de ce type.

En France, la diversité est plus grande. Certaines formules soulignent davantage l'aspect social de notre science, insistant moins sur son côté naturaliste. C'est le cas, par exemple, de celle de Demangeon (1947): »La géographie humaine est l'étude des groupes humains dans leurs rapports avec le milieu géographique». Avec l'accent mis sur les groupes humains, avec la précision qu'implique milieu géographique et non pas milieu physique ou naturel, on sort du cadre des conceptions purement écologiques, on voit déjà dans la géographie une science de nature sociale, mais on exclut toujours de son champ ce qui touche aux interactions purement sociales et se traduit dans l'espace. Tout se passe comme si les définitions de la géographie humaine avaient quelque peine à s'affranchir du point de vue écologique du début du siècle.

Dans le but de ne pas faire apparaître de rupture entre la géographie physique et la géographie humaine, on se croit obligé de définir la seconde en partant du paysage et en faisant timidement une place aux causes proprement sociales des faits analysés. Pour la logique et la clarté de l'exposé, il semble plus naturel de procéder à l'inverse — de commencer par souligner le caractère social de la géographie humaine, avant de montrer son lien avec les études physiques. Nous dirions volontiers que la géographie humaine se donne pour but d'analyser les articulations et la structure spatiales des sociétés humaines et de mettre en évidence la manière dont ces sociétés se projettent sur le sol ou lui sont liées par des rapports de causalité réciproque.

En mettant au premier plan le caractère social de la géographie humaine, on évite les difficultés auxquelles se heurtent la plupart de ceux qui adoptent un point de vue plus traditionnel: obligés de partir d'une analyse des rapports de l'homme et du milieu, d'une description des marques de l'homme à la surface de la planète, ils disposent d'une masse de matériaux expérimentaux, de données concrètes, qu'ils n'ont pas de moyen d'ordonner en logique. Leurs recherches aboutissent souvent à des typologies fastidieuses que complètent par moments de courtes explications de nature sociale — mais ils ne savent pas comment les intégrer dans le cours général de leur argument et ne sont pas sûrs qu'elles soient légitimes ou nécessaires. En définissant la géographie comme une science sociale, on se débarrasse de ces faux problèmes. On fait la place à l'étude des répartitions telle que la concevait, il y a maintenant plus de quarante ans, de Geer (1923); on se retrouve au coude à coude avec les économistes, soucieux eux-aussi d'analyser des

localisations; on voisine également avec les sociologues — certains tout au moins, tels les morphologues sociaux français: n'était-ce pas Halbwachs (1938) qui proposait de définir la morphologie sociale comme la projection sur la terre de toute une société, n'est-ce pas Lefebvre (1960) qui reprend à son compte cette idée pour l'appliquer au champ plus étroit de l'analyse urbaine?

La géographie s'enrichit certainement à intégrer plus largement dans son champ les variables sociales: elle se donne le droit d'être explicative et dépasse les différents stades de la réflexion descriptive, elle cesse d'avoir pour but l'élaboration de simples typologies. Mais ce qu'elle gagne d'un côté, ne le perd-elle pas de l'autre? Ne sacrifie-t-on pas le point de vue écologique, aussi nécessaire que le point de vue social, à opérer de la sorte? Si l'on cherche son inspiration auprès de beaucoup de sociologues contemporains, c'est sans doute vrai: ils ne s'intéressent qu'au social, au sens étroit du mot, ou encore au psychosocial, mais redoutent de se laisser entraîner sur les terrains mouvants de la biologie. Leur point de vue est légitime, mais il est partiel. Le géographe a intérêt à se laisser guider par des esprits plus largement ouverts aux équilibres généraux de la vie. Kardiner rappelle, dans son ouvrage récent (Kardiner et Preble 1966), tout ce que les sciences sociales doivent à l'impulsion darwinienne. La sociologie explore des mécanismes qui lui sont propres et que l'on peut isoler de tout contexte, mais leur étude ne prend tout son sens que si l'on voit ce qui résulte de cette mécanique sociale. Pour Darwin, l'espèce humaine doit à son organisation sociale de poursuivre l'évolution par des voies radicalement différentes de celles des autres êtres organisés : en adaptant les institutions, les outillages, les techniques, aux problèmes changeants de l'environnement, le groupe humain réussit à maîtriser des milieux divers et à triompher, dans la lutte pour la vie, de la plupart des espèces concurrentes. L'interprétation de Darwin est sans doute trop exclusive: elle est à retoucher aussi bien du point de vue des naturalistes que de celui des sociologues. Mais son principe est bon. Etudier pour eux-mêmes les mécanismes sociaux est légitime et nécessaire, mais ne doit pas faire oublier que le but ultime de l'analyse, c'est de comprendre la place que les groupes humains occupent à la surface de la terre. C'est cela qui justifie en bonne part le point de vue fonctionnaliste sans lequel toute analyse sociale devient impossible — Manilowski, (1935) insistait justement sur les liens entre le fonctionnalisme et la biologie. Il cherchait le rapport du côté de l'individu et de ses besoins

physiologiques; il commettait, à partir de là, quelques excès. Il avait pourtant, nous semble-t-il, raison pour l'essentiel: la société remplit un rôle dans l'édifice général de la nature et la sociologie trouve là un des principes les plus généraux d'interprétation.

La géographie humaine comprise comme science sociale comporte donc pour nous deux séries de démarches. Elle se présente d'une part comme une écologie, au sens où les naturalistes emploient le terme et cherche à remettre la société humaine à sa place parmi les équilibres naturels. La géographie humaine se préoccupe d'autre part de la dynamique des forces sociales, de la manière dont elles s'ordonnent dans l'espace: elle devient alors une théorie de la localisation bien davantage qu'une écologie. Faits écologiques et faits d'équilibres sociaux sont si étroitement imbriqués qu'il est difficile d'étudier les uns sans les autres. On peut à la rigueur imaginer une réflexion pure sur les règles de la localisation; il est impensable que l'on puisse construire de la même manière une écologie pure: les rapports entre les sociétés et la nature sont étroitement dépendants des formes de l'organisation des groupes. Comment définir la base écologique d'une cellule sociale? C'est le problème premier dans toute réflexion sur l'économie et le métabolisme des associations naturelles; dans le cas des sociétés humaines, il ne comporte pas de réponse simple: les besoins sont largement variables en fonction des conditions de civilisation et des techniques utilisées. Les rapports spatiaux entre les zones de production et celles de consommation sont plus divers encore. Beaucoup d'ouvrages de synthèse sur la géographie humaine se sont donné pour but de préciser ces points. Sorre (1943—1952) leur a consacré l'essentiel de ses fondements de la géographie humaine. Pour passionnants que soient ses raisonnements, pour riches que soient ses mises au point, son ouvrage n'en présente pas moins des faiblesses, qui tiennent plus à la façon d'aborder le sujet qu'au talent de l'auteur. Les régimes alimentaires, les techniques de culture sont analysés avec beaucoup de minutie, mais il manque, pour ordonner l'ensemble de l'information, une vision claire des types de rapports que les sociétés humaines peuvent entretenir avec le milieu — une réflexion sur les rapports de l'écologie et de la science des équilibres sociaux. Dès la fin du siècle passé, certains géographes avaient pris clairement conscience du problème et avaient proposé des solutions dont les grandes lignes restent valables: Emile Levasseur montrait comment, d'un type de civilisation à l'autre, les bases écologiques des groupes humains s'élargissaient et il montrait

quelles applications on pouvait en tirer pour comprendre les grands faits de répartition des densités (Nardy, *in* Claval et Nardy 1968). Dans la première partie de ce siècle, en France, les enseignements de Levasseur ont été largement oubliés: on leur a préféré les leçons de Paul Vidal de la Blache — très proches, pour l'essentiel, puisque l'un et l'autre s'accordent pour faire de la géographie humaine une science sociale — mais différentes, en ce que Vidal de la Blache se préoccupe plus de sociétés primitives que de groupes développés. De cela, la géographie porte des traces durables: les groupes primitifs sont beaucoup plus étroitement dépendants du milieu que les sociétés actuelles. On les a longtemps considérés comme des groupes archaïques et on a négligé l'importance des structures purement sociales: on les a vu plus simples qu'elles n'étaient. Il a fallu attendre les années trente pour que l'on insiste sur la complication extrême des systèmes de parenté, des règles de la hiérarchie sociale, des relations de groupes, pour que l'on prenne conscience de la complexité, de la richesse et de la cohérence des mythologies et des religions. Jusqu'alors, on pouvait croire que l'analyse des genres de vie — celle, en somme, des relations écologiques du groupe — épuisait l'étude de la géographie humaine. Les études récentes consacrées au problème des relations écologiques des groupes humains rompent avec les postulats implicites dans les analyses classiques: elles insistent sur la diversité et la variabilité des bases écologiques de groupes, montrent que d'un niveau de civilisation à l'autre, les conditions générales de l'équilibre écologique se modifient profondément; elles admettent de la sorte qu'il n'y a pas d'écologie humaine possible sans connaissance des mécanismes de l'équilibre spatial des groupements. Elles révèlent ainsi la liaison étroite qui existe entre les deux grands volets de la géographie humaine et la subordination du point de vue écologique au point de vue social.

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Etudier la géographie humaine, c'est donc pour une part essentielle, mettre en évidence le rôle de l'espace dans les mécanismes sociaux et en déduire les équilibres dimensionnels qui caractérisent les sociétés. Il paraît utile, pour faciliter la réflexion dans l'ensemble de ce domaine, de commencer par définir les divers rôles que l'espace peut jouer et joue dans la vie sociale. Les analyses en retiennent habituellement deux, mais la tendance actuelle est d'en faire apparaître trois — le troisième n'étant, en un sens, qu'une conséquence des deux premiers.

Nous retiendrons cette dernière manière de présenter les choses, car elle permet de bien souligner des phénomènes que l'on a tendance généralement à trop négliger.

L'espace est d'abord le support de toutes les activités humaines. Il faut des terres pour produire la nourriture, des terrains pour construire des usines, des magasins, des bureaux où se déroule la vie laborieuse. Lorsqu'il quitte son travail, l'homme regagne la maison où il abrite sa vie familiale, se repose, se détend. Il se distrait et cherche la compagnie de ses semblables: il fréquente des places, des cafés, des salles de spectacles. Il suit des conférences, des causeries, va au théâtre, au cinéma. Il envoie ses enfants à l'école, suit personnellement des cours du soir, des stages de recyclage. Le dimanche, il éprouve le besoin de fuir les foules, de bénéficier d'un peu de tranquillité: il cherche les lieux retirés, qu'il apprécie pour la détente. Et d'un lieu à l'autre, il a besoin de pistes, de sentiers, de routes, de chemins, d'autoroutes: dans tout cela, il est consommateur d'espace. C'est pour les activités productives que ses besoins sont certainement les plus élevés, mais dans les sociétés affluentes, on s'aperçoit que la somme des autres besoins d'espace est beaucoup plus importante qu'on ne le pensait naguère et que la consommation, dans ce domaine, est extrêmement élastique — si bien que la transformation des genres de vie qu'entraîne le progrès économique se traduit par des bouleversements géographiques dont l'ampleur est déjà considérable et qui deviendront sans doute plus notables dans les années futures.

L'espace n'est pas seulement le support de toutes les activités humaines — il est en même temps obstacle à certaines d'entre elles — il gêne les communications et les relations sociales, il introduit dans la vie des sociétés une certaine opacité, une certaine viscosité. Améliorer l'organisation de la société, progresser, c'est bien souvent triompher de l'obstacle de la distance, assurer une meilleure fluidité, une meilleure transparence. Dès le tournant de notre siècle, Durkheim, (1893) et les morphologues sociaux avaient senti l'importance de ces relations: ils avaient souligné la corrélation grossière qui existe entre le niveau de civilisation et la densité de la population. La dispersion est imposée, dans les civilisations primitives, par l'inefficacité des combinaisons productives, grandes consommatrices d'espace. Les relations sociales s'en trouvent considérablement réduites: elles peuvent être nombreuses, fréquentes, mais ne mettent en présence que des groupes peu nombreux et qui ne peuvent pas se renouveler. Pour

que les modèles d'organisation deviennent dynamiques, pour que le changement apparaisse comme habituel, il est sans doute nécessaire, entre bien d'autres choses, que les groupes deviennent plus nombreux, ce qui permet de multiplier les relations d'où résulte la fécondité de la vie sociale. La mise au point de combinaisons productives efficaces est ainsi une condition nécessaire à l'épanouissement des relations sociales: il est difficile de savoir si c'est le besoin d'une vie de relations plus riche qui pousse au progrès technique ou si c'est le progrès technique qui conditionne l'apparition de formes sociales supérieures — mais les deux faits sont indiscutablement liés. C'est dans la mesure où une société triomphe de l'obstacle que la distance oppose à son organisation que son progrès peut devenir réellement régulier.

Le rôle joué par l'espace dans l'organisation sociale apparaît ainsi double et contradictoire: les activités humaines sont consommatrices d'espace, mais cet espace, qui leur est nécessaire, empêche la société de connaître son plein épanouissement, constitue un frein, un obstacle que l'on s'efforce petit à petit de dominer, de maîtriser. La contradiction est moins forte qu'il n'apparaît à première vue, car les activités sont très inégalement gourmandes d'espace: seule, la production exige — surtout au niveau de l'agriculture — l'utilisation de très larges espaces. Dans tous les autres cas, les espaces dévolus aux différents modes d'activité ou d'occupation sont suffisamment réduits pour que l'obstacle de la distance soit relativement négligeable. Au fur et à mesure que la mobilité des individus s'accroît, l'obstacle apparaît de moins en moins redoutable. On prend mieux conscience d'un autre rôle de l'espace: il n'est pas seulement support et obstacle, il est principe d'organisation: il rend possible les choix, les sélections, il permet à chacun de s'assembler ou de s'isoler, il autorise la construction de sous-unités permanentes ou provisoires, facilite ainsi le jeu de la machine sociale: sans assise spatiale, les institutions que la sociologie se plaît à analyser ne pourraient fonctionner, la société ne pourrait être à la fois cet ensemble cohérent et cette somme d'unités en partie indépendantes, dont nous éprouvons tous les jours la souplesse et l'efficacité. La géographie humaine, lorsqu'elle s'est voulue sociale, s'est trop souvent contentée d'analyser l'espace comme support — elle a été surtout économique — ou comme obstacle — elle était plus volontiers politique dans ce cas. Lorsqu'on prend conscience du rôle sélectif de l'espace dans tous les processus sociaux, on comprend l'apparition de relations ordonnées et différenciées: on saisit ce qui fait l'originalité de la géographie

humaine: on voit qu'elle est intimement mêlée aux autres disciplines sociales, mais qu'elle ne saurait être absorbée par elles.

Le géographe ne peut ainsi rester au seuil de l'analyse de la société: les faits de distance et de superficie sont significatifs à tous les niveaux de l'étude: la géographie humaine n'est pas un préambule de la sociologie, une introduction, un cadre qu'on pourrait ensuite oublier ou négliger: elle est partie intégrante des sciences sociales et moule sa structure sur celle de la plupart des groupes qu'elle cherche à expliquer.

*

Il est difficile, nous l'avons dit, de ne pas faire appel à un certain fonctionnalisme lorsqu'on cherche à percer les mécanismes sociaux: tout ce qui se passe dans la vie sociale n'a pas de signification claire, tout ne concourt pas à l'harmonie générale, il existe des comportements, des institutions qui sont dysfonctionnels — mais on ne peut cependant trouver d'explication que si l'on analyse le fonctionnement d'ensemble du corps social, que si on l'envisage un moment comme une mécanique permettant de répondre à certains besoins. Une manière commode de classer ceux-ci est de les grouper en besoins de reproduction, besoins d'entretien, besoins de relations sociales, besoins spirituels ou intellectuels. Le système social ainsi défini possède par ailleurs certaines propriétés remarquables — celle d'évoluer, dans certains cas, mais aussi celle de se montrer stable durant des périodes qui excèdent de beaucoup la vie de tous ses membres. C'est dire qu'une analyse qui ne restituerait que le fonctionnement instantané de la machine sociale ne pourrait suffire à notre curiosité: la socialisation des jeunes, leur apprentissage, leur intégration dans la cellule intéressent tous les aspects des sciences sociales — la géographie humaine en particulier.

Comment aborder l'étude du fonctionnement du corps social d'un point de vue qui permette de mettre en évidence tout ce qui touche à l'espace? En analysant, nous semble-t-il, la vie sociale sous la forme de circuits d'échanges et de relations: c'est de cette manière qu'on peut le mieux saisir les trois rôles de l'espace dans les équilibres sociaux. Les besoins de consommation d'espace sont en bonne partie générateurs des obstacles sur lesquels butte l'organisation générale de la vie du groupe; l'espace est le grand disjoncteur qui autorise la différenciation des activités et des relations; tout cela apparaît nettement lorsqu'on décrit les flux de biens, d'informations, d'ordres et qu'on explique leur équilibre. Les besoins de la reproduction entraîne des passages, des

mutations de personnes d'un groupe à l'autre — selon des règles que l'analyse précise des systèmes de parenté a permis de mettre en évidence. Lévi-Strauss (1949) montre comment il y a là un principe essentiel pour la compréhension de l'organisation générale des sociétés.

Les besoins de subsistance entraînent plus que les autres des consommations d'espace et des échanges. Faute de bien voir que l'analyse des circuits économiques ne suffisait pas à rendre compte de tous les aspects de la géographie humaine du monde moderne, on a souvent réduit la pratique de notre discipline à celle d'une certaine forme de l'économie politique; les excuses sont nombreuses. Les circuits économiques ont été analysés avec plus de soin qu'aucun autre: on ne prend conscience de l'existence de règles générales de la circulation des personnes entre les groupes que depuis deux générations; il y a trois siècles que l'économie politique fournit les bases d'une analyse systématique de la circulation des biens et des services.

Les besoins de relations sociales, les besoins d'ordre supérieur, intellectuels ou religieux supposent des déplacements de personnes, des contacts personnels. Ils donnent lieu à des échanges de renseignements, de services: ils entrent donc, de cette manière et dans une certaine mesure, dans le champ que la théorie économique a permis de clarifier: ce qui s'applique aux circuits de biens vaut généralement pour ceux de services. Mais ces éléments n'enserrent pas l'essentiel, dans le domaine des relations supérieures: ce qui compte le plus, ce n'est pas le déplacement de personnes — qui disparaît d'ailleurs lorsque l'écrit, le téléphone, la radio et la télévision sont couramment utilisés; ce n'est pas non plus la prestation de service que l'on peut traduire en langue économique, car elle est généralement codifiée et comporte un système équilibré d'échange. Ce qui est au coeur de ces échanges, ce sont les flux d'informations, d'ordres, de nouvelles et la manière dont ils se diffusent, dont ils se répandent (cf. Hägerstrand 1952). Dans leur établissement et dans leur équilibre, les conditions physiques comptent moins que les conditions humaines, sociales, psychologiques. Les mêmes impulsions sont reçues ici, rejetées là, modifiées presque toujours en profondeur. A ce niveau la machine sociale apparaît infiniment complexe: elle comporte une foule de circuits, entre lesquels les commutations sont possibles, mais ne s'établissent qu'en fonction de règles délicates; elle est faite de boucles d'amplification et de dispositifs d'amortissement, dont le branchement peut modifier du tout au tout le résultat des impulsions venues de l'extérieur. Pour employer un langage plus

fréquent chez les sociologues, on pourrait dire que les relations sociales, intellectuelles, religieuses, manifestent plus directement que les circuits économiques l'importance des faits de valeur dans la vie sociale. C'est à ce niveau que l'on sent le mieux qu'il est impossible de traiter de problèmes géographiques sans parler de la culture des groupes humains intéressés.

Présentée de cette manière, la géographie humaine apparaît comme l'analyse de tous les circuits et de toutes les relations qui donnent à la société ses dimensions et ses structures spatiales. Le cadre et les méthodes de la géographie humaine nous semblent maintenant définis avec précision.

Lorsqu'on essaie de comprendre de manière concrète le fonctionnement du corps social, on est obligé de se laisser guider par le sociologue: il nous montre comment est fixé le programme d'ensemble de la société et comment il est exécuté. La dynamique générale des rôles et des statuts explique assez bien la cohérence générale de la machine sociale, sa stabilité, les possibilités d'intégration des individus dans le cadre des institutions collectives. En fournissant une interprétation générale de l'organisation des rapports entre les individus, en montrant comment les faits de stratification et de hiérarchie ont une valeur fonctionnelle, en mettant en évidence les rapports entre la personne et le groupe, en donnant un aperçu sur la formation des comportements et des attitudes collectives, l'analyse des rôles et des statuts a apporté à la sociologie, depuis une trentaine d'années environ, une direction de recherches qui permet de saisir dans un même ensemble des faits qui semblaient jusqu'alors disparates.

Le géographe est particulièrement intéressé par tout ce qui touche aux rapports, aux échanges, aux relations qui se nouent entre les diverses parties du corps social. L'analyse des rôles et des statuts lui apporte beaucoup d'éléments nécessaires à son interprétation. Elle explique comment les contacts sociaux prennent régularité et permanence, fait apparaître le rapport entre ce qui semble pure analyse statique des structures et ce qui est étude des mécanismes: les relations sont codifiées, elles sont institutionnalisées; les agrégats, les groupes, les classes qui caractérisent telle ou telle société traduisent les caractères essentiels des rouages et des entraînements sociaux. La description des faits de structure, à laquelle se résume la géographie sociale, apparaît maintenant à sa vraie place: la description de l'architecture sociale ne saurait constituer une fin en soi. La géographie doit aller au-delà de la simple

description raisonnée et, pour cela, elle doit, comme la sociologie, insister sur la signification des aspects structurels et montrer comment ils traduisent la dynamique profonde du corps social.

L'architecture sociale des sociétés mérite donc d'être analysée d'un point de vue dynamique, dans le cadre général de l'interprétation du fonctionnement de la machine sociale. Elle est souvent plus facile à appréhender que les relations qu'elle régularise et ordonne. On a donc souvent intérêt à s'attarder sur ses aspects, pour en déduire les traits de la vie de relation et les caractères des mécanismes: ainsi bien souvent, en matière scientifique, est-il plus facile d'appréhender les champs de forces qui déterminent les flux que les mouvements eux-mêmes.

Comment ordonner les résultats de toutes les recherches de géographie humaine? Il nous semble que deux démarches sont possibles. Le géographe peut, dans certains cas, s'intéresser plus particulièrement aux circuits qui cimentent la société: il fera alors de la géographie systématique, pratiquera la géographie économique, la géographie religieuse, la géographie politique. Il est des cas où la démarche adoptée est différente: on choisit comme but de cerner ce qui fait l'originalité de telle ou telle cellule sociale, on essaie de voir ce qui explique son équilibre territorial: nous voici plus directement dans la géographie sociale, les groupements humains sont saisis dans leur totalité, on évite de les disséquer artificiellement: c'est là l'approche de la géographie régionale classique, mais cette géographie régionale ne s'oppose pas, dans son esprit, à la recherche d'une connaissance générale. Elle part de l'idée que les formes d'organisation de l'espace que révèle le paysage résultent pour l'essentiel du jeu de forces sociales, que la stabilité des êtres territoriaux est à la mesure de la permanence des sociétés ou des civilisations. Elle fournit un cadre général de méditation, permet de comprendre les caractères communs aux organisations de l'espace que constituent la campagne, la ville ou la région. Cette géographie régionale s'élève donc à un plan général — mais la diversité des cultures, la diversité des milieux physiques aussi et des combinaisons écologiques sur lesquelles s'appuient les sociétés laissent subsister une part qui échappe aux régularités: la géographie des constructions territoriales est, dans une certaine mesure, une science idiographique.

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EARLY TS AREAS

AN EXPERIMENT

by

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Newspaper research has become an important branch of social science just as *umland* research has been for decades. It is thus fruitful to combine these two branches of social science and investigate newspapers also from the point of view of *umland* research. This has been done at times but facts about TS areas (TS stands for Swedish "tidnings-spridningsområde" meaning "newspaper distribution area of a town") are usually primarily estimated when they can be used as a tool in current commercial and administrative work.

As in the case of most phenomena in society, it is necessary to know the historical background of the TS areas if they are to be understood fundamentally. This of course is the case too for all central community functions.

The Swedish "TS-boken" being an atlas of Swedish newspaper distribution areas, had precursors in the periodical "Affärsekonomi", for instance of the year 1933, p. 475. It is worth trying to investigate ways of constructing TS maps for earlier points of time than 1933. It seems to be impossible to get earlier information about the subscribers to a newspaper, except in some rare cases which are of little use, just because they are exceptional. An indirect method must be used. One could for instance expect to get a picture of the distribution area through the contents of the newspaper.

A glance at the newspapers of the 1860s and 1870s tells us immediately that the choice of such useful contents is very limited. Family notices and local reportage, both characteristic of the modern



Fig. 1. TS areas for the region Uppsala—Falun—Arboga, according to auction advertisements about 1860. The place of each auction is indicated by the initial letter of the town where the journal with the auction advertisements was edited. The region within which all towns with newspapers have been investigated is delimited by a broken line. Scale 1:1,5 million.

Swedish local press, did not yet exist. One has to limit oneself to the advertisements, and it soon appears that only one type of advertisement is uniform and at the same time of sufficient frequency to be possible to use for our purpose, namely auction advertisements.

First of all one has to deal with the personal estate auctions of farmers, and less frequently of rural workers and rural craftsmen, the

latter a characteristic Swedish group. It proves that these auctions are in most or in all cases advertised in the newspaper/s of the town which one could expect to be the most suitable for the purpose. Auctions in real estate, firewood, grain, cattle and farming implements and of the personal estate of *ståndspersoner* (i.e. rural persons of higher class) are advertised also in the newspapers of more distant towns. Compulsory (sw. *exekutiva*, under the sheriff's authority) auctions prove to be less useful.

But the auctions of the farmers were advertised in the 'town' newspaper (sw. *stan*). Was this so because they expected to reach the people in the neighbourhood of the farm or did they expect to entice the townspeople to attend the auction? The question if and to what degree the town newspaper really was read in the countryside cannot yet be answered. But we find the latter of the two alternatives mentioned to be less probable and therefore accept the former as a working hypothesis, namely that the auction advertisements were intended for the rural population in the neighbourhood of the farm and within the subscribing area of the town newspaper.

A great number of towns began to get newspapers about 1860 (see Lundstedt, Sveriges periodiska litteratur III, Landsorten 1813—99, Stockholm 1902.) This date seems particularly interesting since on the whole it precedes the building of the Swedish railway system.

Very often one cannot make up the figure of 25 auctions of the same kind and with useful information in the issues of one year of the paper at that time. (The auctions culminate in March in connection with changes of tenants but occur sporadically all around the year). If the figure of 25 auctions has not been reached supplements have been made from the year 1859 and if necessary from 1861. Also newspapers which did not start until some years later have been used to make up for the deficiencies in the stock of newspapers.

The following newspapers have been excerpted and mapped:

Arboga Tidning 1859—1860

Dalpilen 1860 (Falun)

Enköpings Allehanda 11/3 1863—1864

Eskilstuna Allehanda partly 1859, the whole year 1860

Hedemora Tidning 5/9 1864—1866

Köpings Tidning 1860—61

Sala Tidning 1861—63

Upsala 1/1—15/10 1860

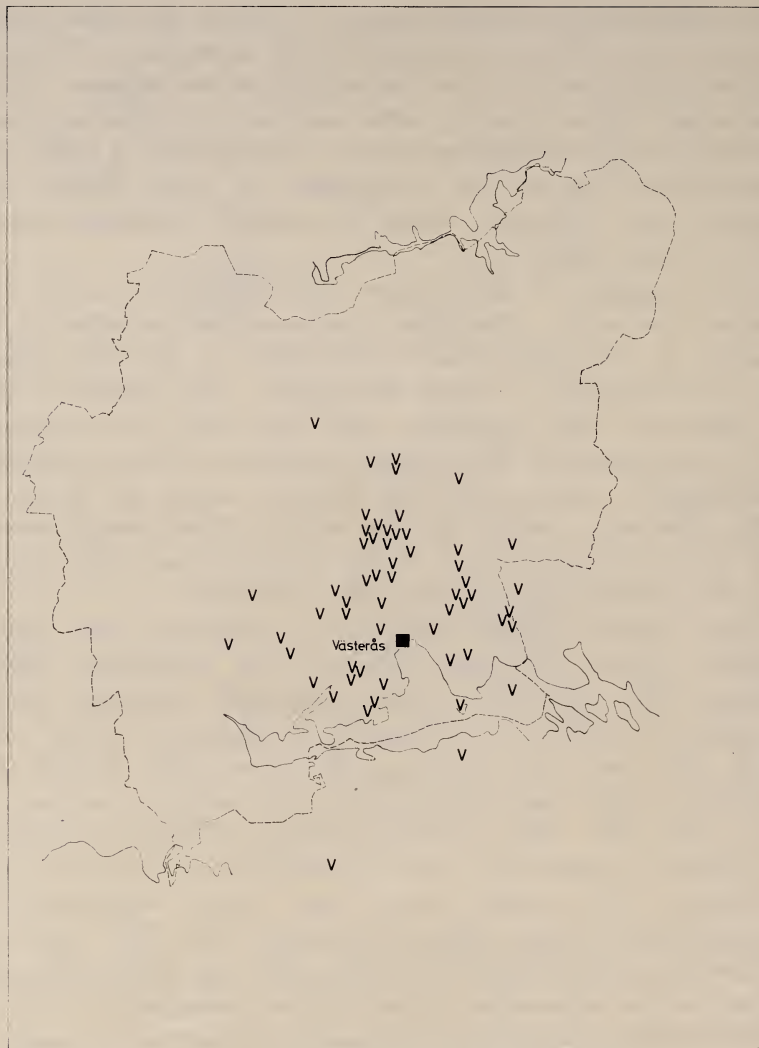


Fig. 2. The distribution area for Vestmanlands Läns Tidning in the year 1900. Västmanlands län is marked on the map. Scale 1:1,2 million.

Upsala-Posten 1/1—31/3 1860

Vestmanlands läns Tidning 1859—60 (Västerås)

The attached map shows what use can be made of this method. The map should be regarded as an experiment but it seems to indicate that rural Sweden at this time was not yet covered by local newspapers.

The present *storkommun* of Fjärdhundra is practically absent from the advertisement columns of any newspaper. The same is true of the Kolbäcksån valley from Hallstahammar northwards. These facts give however an interesting insight into the intensity in rural-urban connections at this time.

For the sake of comparison the auction advertisements of Vestmanlands Läns Tidning during a part of 1900 and during the first half of 1950 have been mapped. In all probability the 1900 map can be regarded as well mirroring the distribution of VLT at that time. The map of the year 1950 can be compared to the actual TS-area of that year. The correlation is good, especially for auctions only for personal estate and not those entitled 'Great auction' (*Stor auktion*), a common term in the auction advertisements. Of the 8 auctions outside Västmanlands län and the Kolbäcksån valley (of those in Uppsala län only those north and east of Enköping) 5 were 'Great', but only 4 inside the area mentioned. This corroborates our statement that 'Great' auctions are not usable for our purpose.

Compared with the 1900 pattern, VLT 1950 seems to expand towards the northwest, which is corroborated by the first published TS map (in "Affärsökonomi" 1933, p. 511). A good agreement between the auction map and the TS area seems to exist and the divergences are easily explained by the fact that the TS-limits always follow the *kommun*-borders which often pass through uninhabited areas. VLT as an advertising paper seems to make a strong encroachment into the Enköping TS area but this mainly through such auctions where cattle are also offered for sale.

Experimentally it has been decided that to demarcate a newspaper distribution-area (and the like) satisfactorily, at least 50 and preferably 100 advertisements (or other points showing the influence of a central place) are needed if chance is not to influence the pictures that the map presents. To find 100 advertisements in these old newspapers is a considerable task and so is the identification of the farms mentioned in the auction advertisements. At least 20—30 % of these farms are not to be found without considerable study of the maps. One method that might be used is to limit the investigation to the period January 15—March 31, the peak time for the auctions. Also one might restrict the mapping to the auctions in the parishes within a distance of 10 to 15 km from the newspaper centre and count only these auctions.

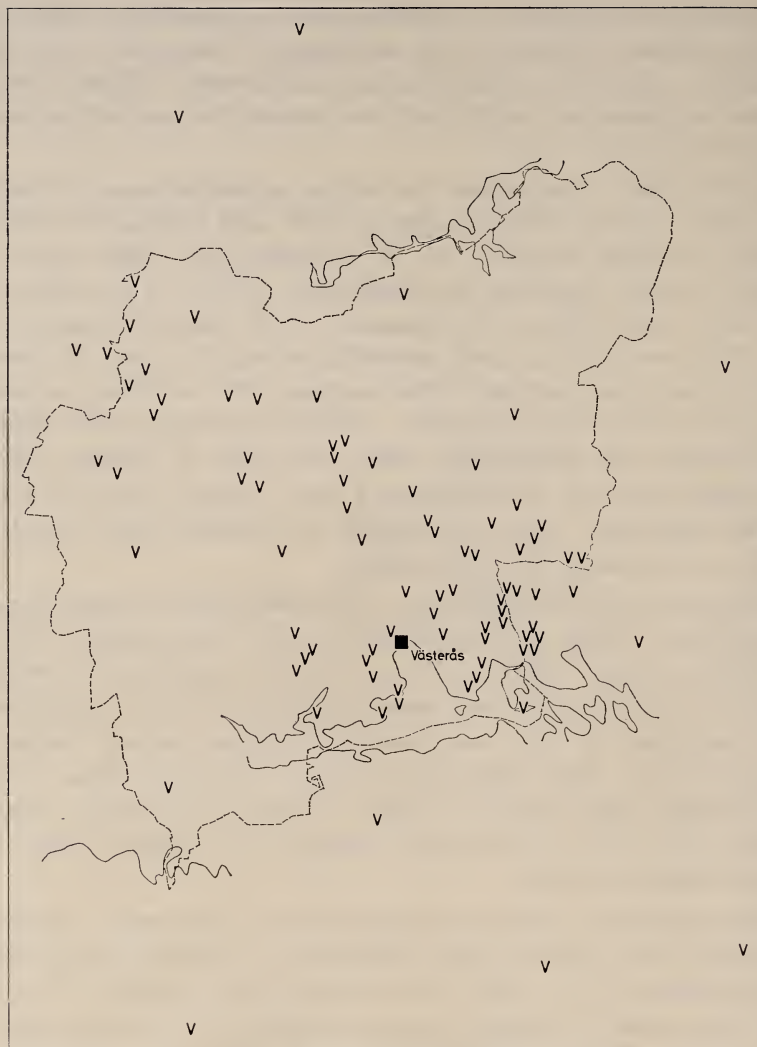


Fig. 3. The distribution area for Vestmanlands läns tidning in the year 1950. Västmanlands län is marked on the map. Scale 1:1,2 million.

The modern TS-areas do not conform to the retailing areas, not least because the central places with retailing areas are three or four times as many as the TS centres. They can not be expected to do so in former times either. Nevertheless — as a working hypothesis —

we venture to regard these old TS areas as a significant measure of the strength of influence of the towns in question.

We can not provide conclusive evidence that the 1860 advertisements-areas of personal estate auctions of the rural population were the same as the distribution areas of the newspaper but we find everything pointing in that direction.

Research is also being done along other lines to make clearer the former areas of influence of the towns.

AGRICULTURAL HOLDINGS IN SWEDEN 1951—1966 AND 1980

by

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The year 1947 was highly significant for Swedish agricultural policy. According to the principle that the income of the agricultural population should be raised to a level equal to that of employees in industry, numerous measures were introduced to make agriculture more effective. They are summarised in the Act "Jordbrukets inre och yttre rationalisering". (The internal and external rationalisation of agricultural holdings.) Bad partition of land had to be improved, and holdings which were too small had to be amalgamated or extended by purchase from neighbours. Ten hectares of arable land was fixed as the lowest standard limit for the size of an economically viable farm ("basic holdings"). When it is noted that not less than 70 % of the holdings in Sweden at that time owned less than these stipulated 10 hectares it is easy to see that agricultural reorganisation faced a gigantic task. Large resources were made available to reverse the long established split-up of the arable land and the County Agricultural Boards were given a large degree of authority to assist the rationalisation.

Twenty years later (1967) an Act of Parliament was passed for the continued rapid rationalisation with the further abandonment and amalgamation of holdings to the limit where national self-sufficiency in food was 80 % of that required in peace time. There are, however, agricultural experts who are of the opinion that the decrease in the total harvests will never drop to the 80 % limit since each field will now considerably increase its yield.

The changing of Swedish farming has been rapid and can be seen from Table 1 of holdings in size classes together with their arable

Total number of holdings. Thousand									hectares Total
2—5	5—10	10—15	15—20	20—30	30—50	50—100	>100		
1951	96	90	40	20	18	11	5	2	282
1956	88	83	39	21	18	12	5	2	268
1961	67	75	33	20	18	12	5	2	232
1966	47	55	26	18	18	13	6	2	186

Arable area, 1 000 hectares									hectares Total
2—5	5—10	10—15	15—20	20—30	30—50	50—100	>100		
1951	350	682	501	358	438	433	369	395	3 527
1956	320	635	494	367	458	451	370	394	3 488
1961	251	572	426	363	457	465	372	390	3 296
1966	179	419	336	315	461	515	429	402	3 058

Source: Jordbruksräkningen 1966, tab. B.

area 1951—1966. Holdings of less than 2 hectares are not included. The decrease in both the size of the holdings and of the arable area has been considerable during the three 5 year periods. The 15—20 hectare size group is interesting in that after an initial increase the trend was reversed in 1961. The classes of more than 20 hectares are increasing steadily except for the largest size group, which fluctuates a little.

In 1961 Sweden had 3.3 million hectares of arable land and 164 000 hectares of cultivated natural pastures while in 1966 the respective areas were 3.06 million hectares and 194 000 hectares. Thus the area of arable land has diminished by 0.24 million hectares. How much more can it be expected to diminish?

Turning to the regional differences in the effects of the rationalisation we can first look at the figures in Table 2, which is arranged by counties. The majority of the abandoned farms, both absolutely and relatively, were situated in the northernmost counties of Norrbotten and Västerbotten. Even other forest counties as Västernorrland, Värmland and Kronoberg have many holdings, which have been taken out of production. The same has occurred in other counties with good agricultural conditions where as in Stockholm and Malmöhus, the proximity of a large city has been significant.

From Table 2 it can also be seen that a high level of holding abandonment is not necessarily followed by a large decrease in the

Table 2. *Changes in arable area and total number of holdings 1961—1966.*

County	Arable			Holdings		
	1966	Change 1961—66		1966	Change 1961—66	
	ha	ha	%	Total	Total	%
Stockholm	116 571	— 10 739	— 8,4	3 607	— 926	—20,4
Uppsala	134 088	— 5 915	— 4,2	3 793	— 798	—17,4
Södermanland	150 985	— 9 093	— 5,7	3 946	— 1 024	—20,6
Östergötland	216 521	— 9 797	— 4,3	7 059	— 1 563	—18,1
Jönköping	105 236	— 10 139	— 8,8	10 169	— 1 927	—15,9
Kronoberg	69 890	— 10 327	—12,9	8 219	— 2 085	—20,2
Kalmar	149 586	— 12 406	— 7,7	7 911	— 1 671	—17,4
Gotland	80 134	— 924	— 1,1	3 632	— 534	—12,8
Blekinge	43 527	— 4 844	—10,0	3 329	— 751	—18,4
Kristianstad	193 878	— 13 767	— 6,6	10 780	— 2 446	—18,5
Malmöhus	298 549	— 15 427	— 4,9	11 046	— 2 144	—16,3
Halland	127 291	— 7 371	— 5,5	7 948	— 1 326	—14,3
Göteborg	74 021	— 5 374	— 6,8	6 533	— 1 483	—18,5
Älvsborg	171 344	— 13 959	— 7,5	14 408	— 3 100	—17,7
Skaraborg	282 004	— 10 404	— 3,6	13 101	— 2 696	—17,1
Värmland	133 643	— 18 570	—12,2	10 767	— 3 397	—24,0
Örebro	123 583	— 10 148	— 7,6	5 231	— 1 591	—23,3
Västmanland	147 867	— 4 598	— 3,0	4 296	— 873	—16,8
Kopparberg	69 117	— 7 608	— 9,9	5 909	— 1 984	—25,1
Gävleborg	86 601	— 8 822	— 9,2	7 484	— 1 886	—20,1
Västernorrland	71 069	— 11 764	—14,2	9 810	— 2 942	—23,1
Jämtland	51 659	— 5 885	—10,2	6 904	— 1 650	—19,3
Västerbotten	103 879	— 14 012	—11,9	12 948	— 3 992	—23,6
Norrbottn	56 499	— 16 980	—23,1	7 413	— 3 888	—34,4
Sweden	3 057 542	—238 876	— 7,2	186 243	—46 677	—20,0

Source: Kungl. Lantbruksstyrelsen. Meddelanden serie A 1937, nr. 6.

arable land. We can look at a county such as Södermanland with a decrease of 5.7 % in the arable land but a decrease of 20.6 % in the number of holdings or Malmöhus with 4.9 % and 16.3 % respectively, Skaraborg with 3.6 % and 17.1 % and Västmanland with 3.0 % and 16.8 %. They can be compared with Norrbotten with a 23.1 % decrease in the arable land and a decrease of 34.4 % in the number of holdings.

A detailed account of the development of the holdings and their arable land in Sweden was published in a prognosis by the Agricultural Board of Sweden in 1967 (Kungl. Lantbruksstyrelsen, Åkerjordens framtida omfattning och lokalisering. Meddelanden 1967, serie A nr 6). This ambitious investigation has carefully mapped the extent

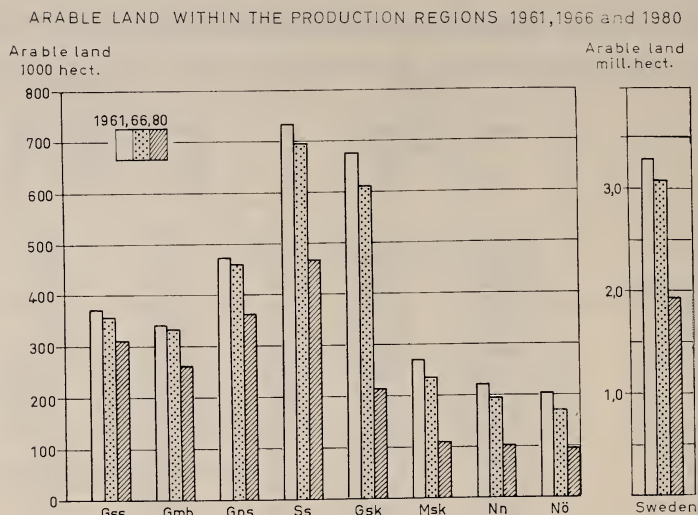


Fig. 1. Arable land within the production regions in 1961 and 1966 (exclusive of units less than 2 ha.) together with long-term prognosis of arable area in 1980.

of the holdings and their conditions in the different parts of the country. The Board has also tried to draft a first plan of agricultural land-use in the future.

The most interesting feature of this survey is an estimation of the total arable land in 1980. The board has also divided the cultivated area into (1) that which will still be under cultivation in 1980, (2) that which will probably be abandoned by that date (marginal land) and (3) that which will be taken out of production in the near future (Figs. 1 and 2). This prognosis is based on an estimation of the annual returns of the present farms in the long-term with regard to soil conditions, field pattern, site and, very important, the occurrence, or otherwise, of large continuous areas of cultivable land. Some regard has been paid to other forms of land-use, e.g. urban and recreational. The survey is mapped in 1:50 000 with 25 - hectares dots. The procedure is very interesting with the work being done at the drawing table on the basis of economic photo maps. With respect to the concentration of agricultural land, it is desired that the arable land be so situated that areas of not less than 50 hectares can be created in association with an economically sound farming centre.

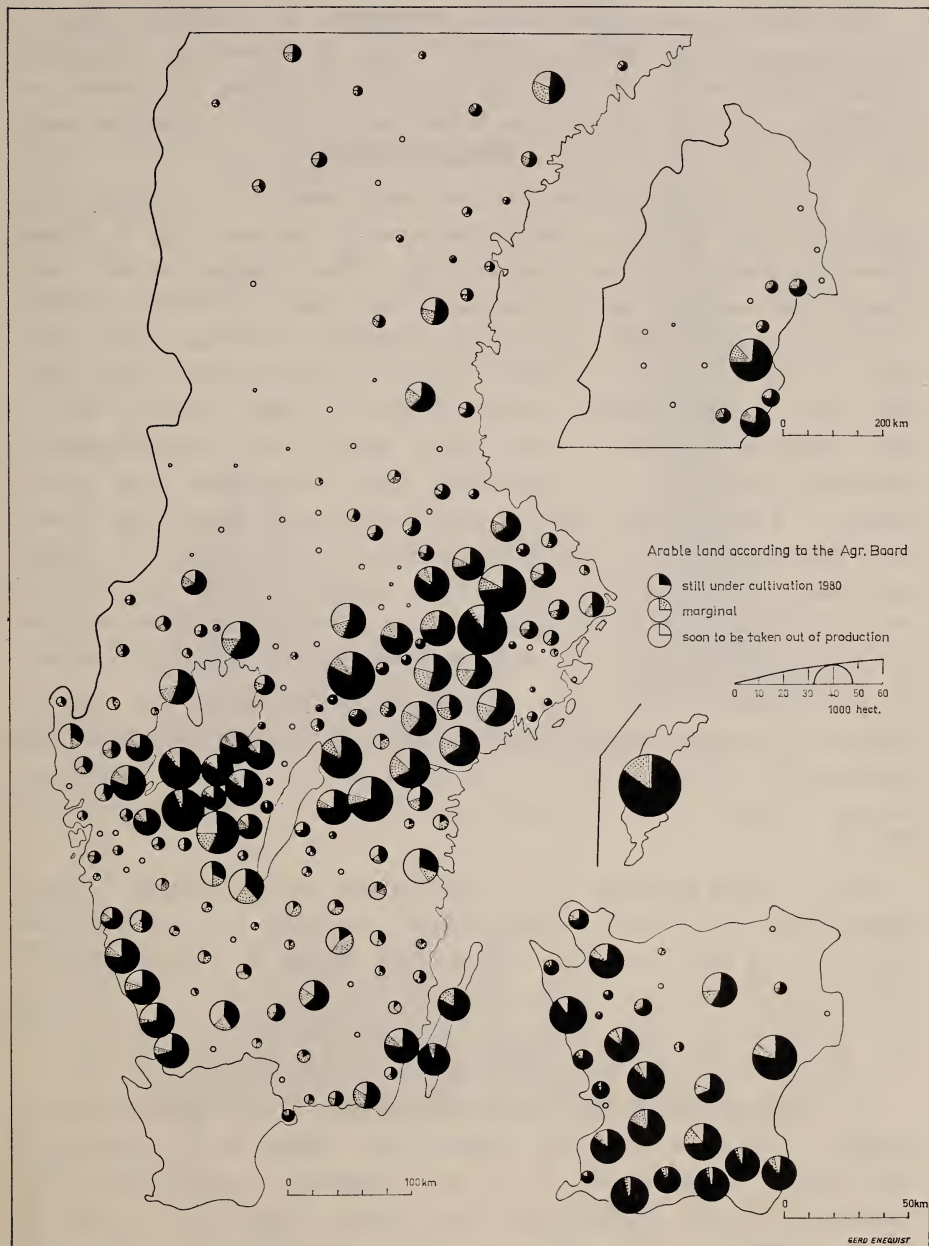


Fig. 2. Remaining arable land, marginal land and abandoned land according to the Agricultural Board's prognosis.

The above survey sums up the calculations in a diagram (Fig. 1) for the years 1951, 1966 and 1980. Here is shown an anticipated strong concentration on the true agricultural plains of Sweden — the region surrounding the Lakes Mälaren and Hjälmaren, the Östgöta plain, the Vänern plain, the plains of Skåne-Halland etc.

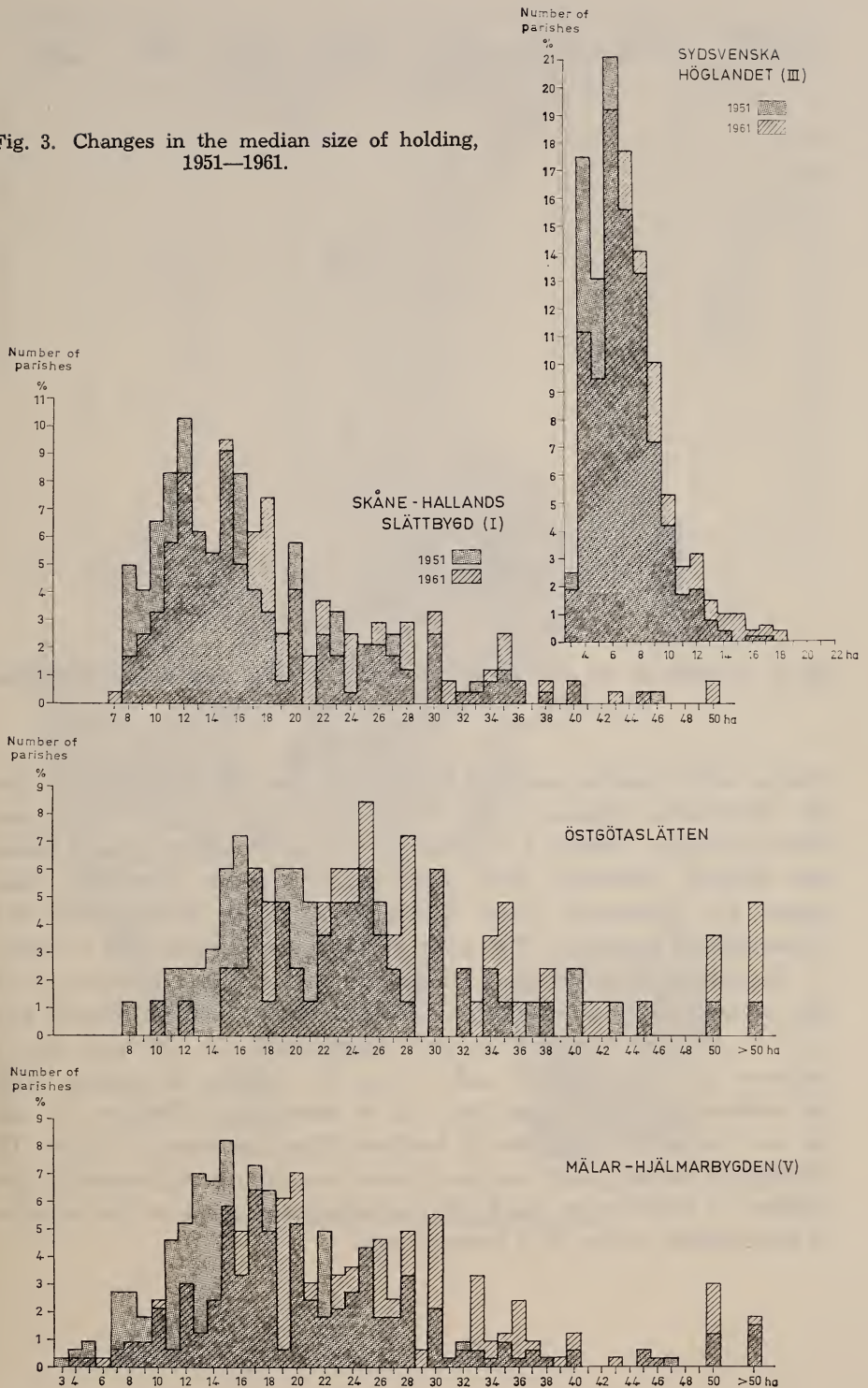
A more detailed picture of the three classes of holdings, with different length of life, is given in the circular diagram (Fig. 2), where commune-blocks are the regional units. This diagram shows more clearly that even the agricultural plains have been classified according to their possibilities for economically justifiable farming in the long-term. It is anticipated that the blocks in Södermanland will retain only half of their present cultivated area in 1980, probably due to the considerable division of the arable land in this mosaic landscape with its many lakes. On the other hand, the arable land of the blocks in Västernorrland, Sala, Örebro and Halland, and some of the blocks in Västergötland, are expected to cultivate a considerably higher percentage of their land in 1980. The islands of Öland and Gotland will still be agricultural regions. Most exposed to abandonment are the forest areas in the north and the blocks in the upland of Småland.

As mentioned above, the agricultural policy has as its aim the creation of larger holdings. This is reflected in a change in the median holding size, which is set out in the figures 3—7. The production regions referred to in this paper are delimited on the inset map of Fig. 6.

Fig. 3 shows a change in the median size of the holdings in three agricultural regions and a forest region calculated in 1-hectare-classes for the years 1951 and 1961. The gradual change is evident especially in the 15—20 hectares size class on the plains and the 5—20 hectares size group in the forest regions. Unfortunately this calculation could not be made for the year 1966 owing to the shortage of time.

The diagram Fig. 4 sums up the development in the eight production regions of Sweden using the common size classes of the censuses of agriculture: 2—5, 5—10, 10—15 etc. hectares of arable land. The regional units are parishes and the number of parishes in each size class is calculated. The differences in development of the various parts of Sweden is striking. The whole of Norrland (regions VII, VIII), as well as Mellersta Sveriges skogsbygder (region VI), show only a slight

Fig. 3. Changes in the median size of holding, 1951—1961.



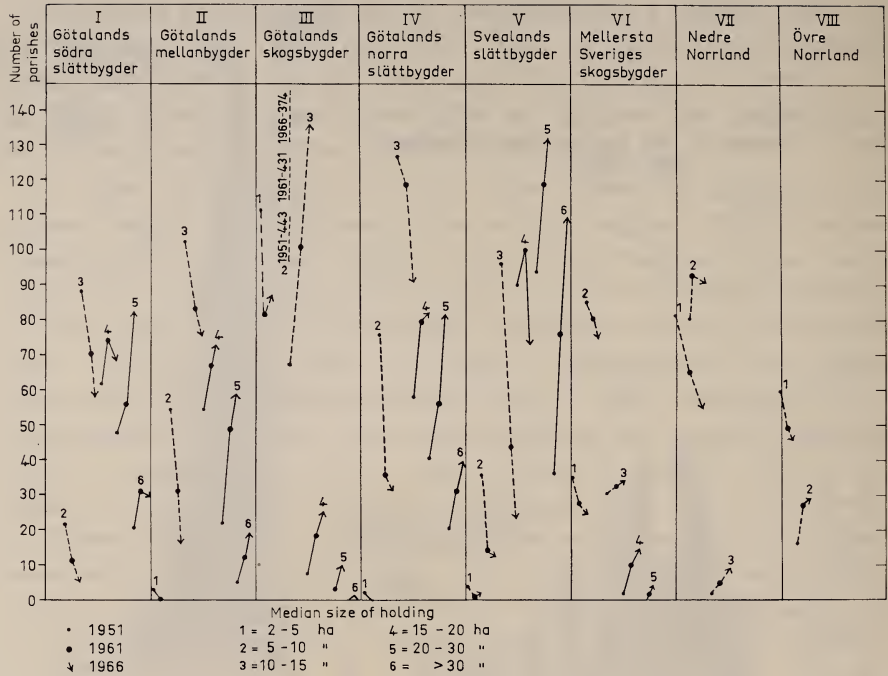


Fig. 4. Changes in the median size of holding by size class during the period 1951-1966. Vertical axis = number of parishes.

change while Sweden south of Bergslagen changed considerably. But the agricultural regions in this latter part of the country show different reactions. Region I (Götalands södra slättbygder), where Skåne and Halland dominate, gives a much more stable impression than region IV (Götalands norra slättbygder), where Östergötland and Västergötland dominate. The most vigorous changes are seen in region V (Svealands slättbygder). The trend however is the same in all agricultural plains i.e. a decrease in the classes with a median size of 2-5 hectares (class 1 in the diagram), 5-10 (2) and 10-15 hectares (3). In regions I and V even the number of parishes with the median size 15-20 hectares (4) is decreasing. Contrary to this we can notice that the 10-15 hectares class increases in region III (Götalands skogsbygder) but here above everything an increase in the number of parishes in the 5-10 hectare class occurs at the expense of the number in the 2-5 hectare class.

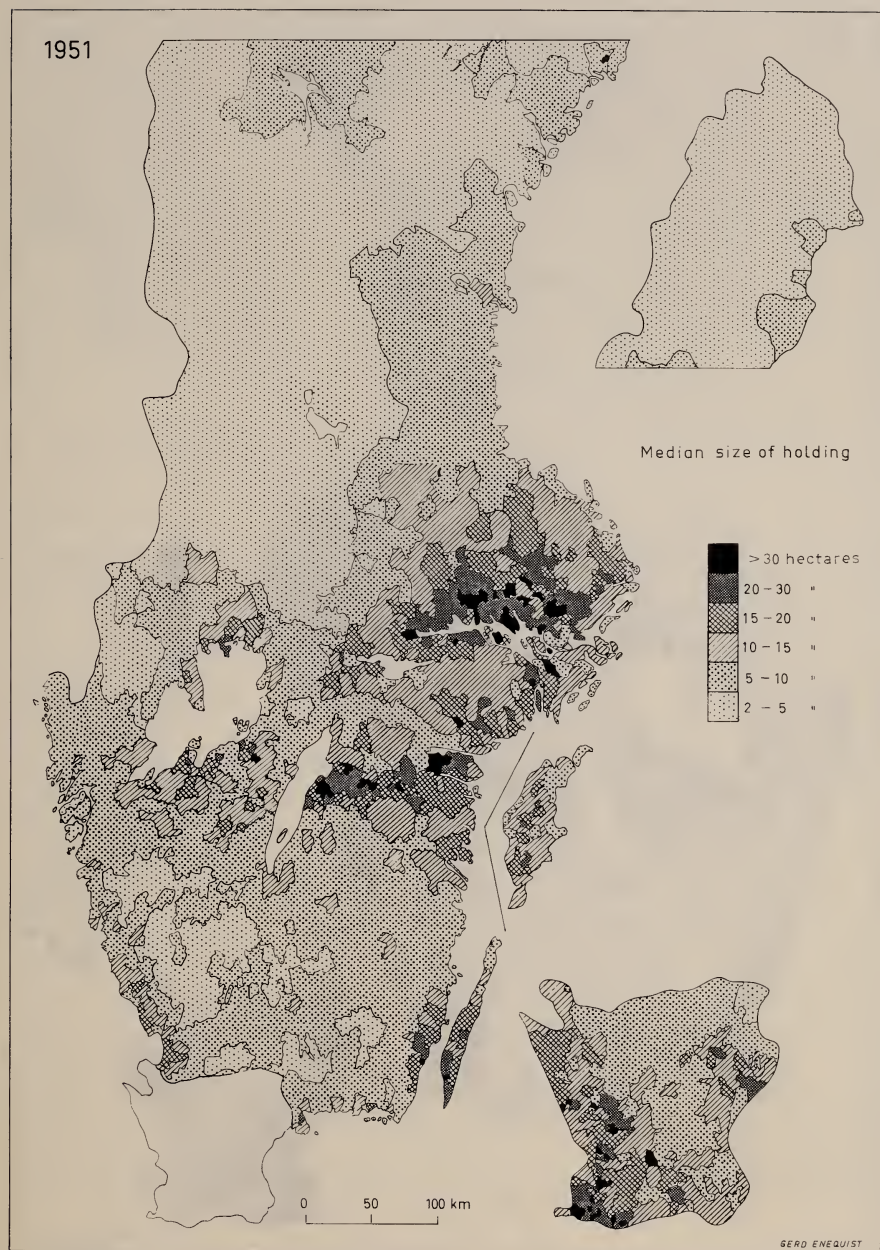


Fig. 5. Median size of holding in 1951.

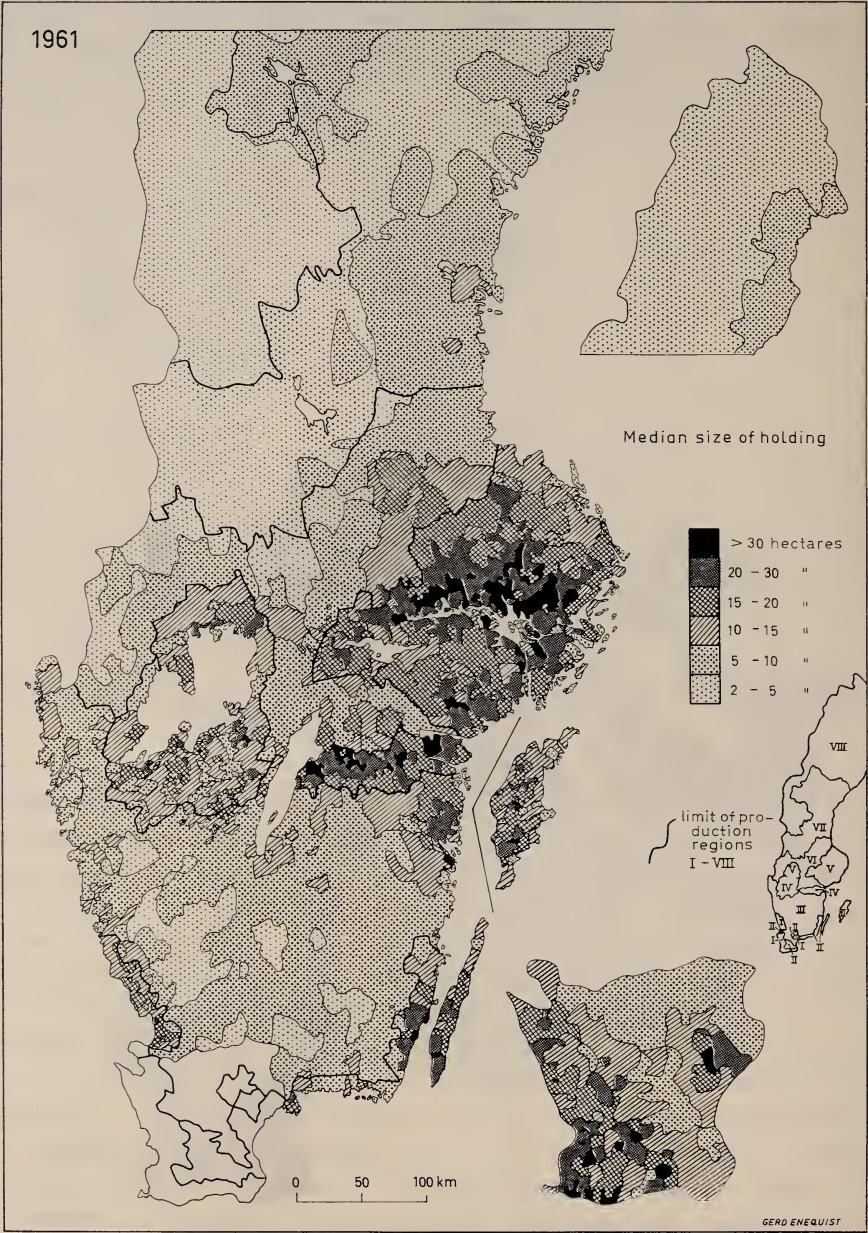


Fig. 6. Median size of holding in 1961.

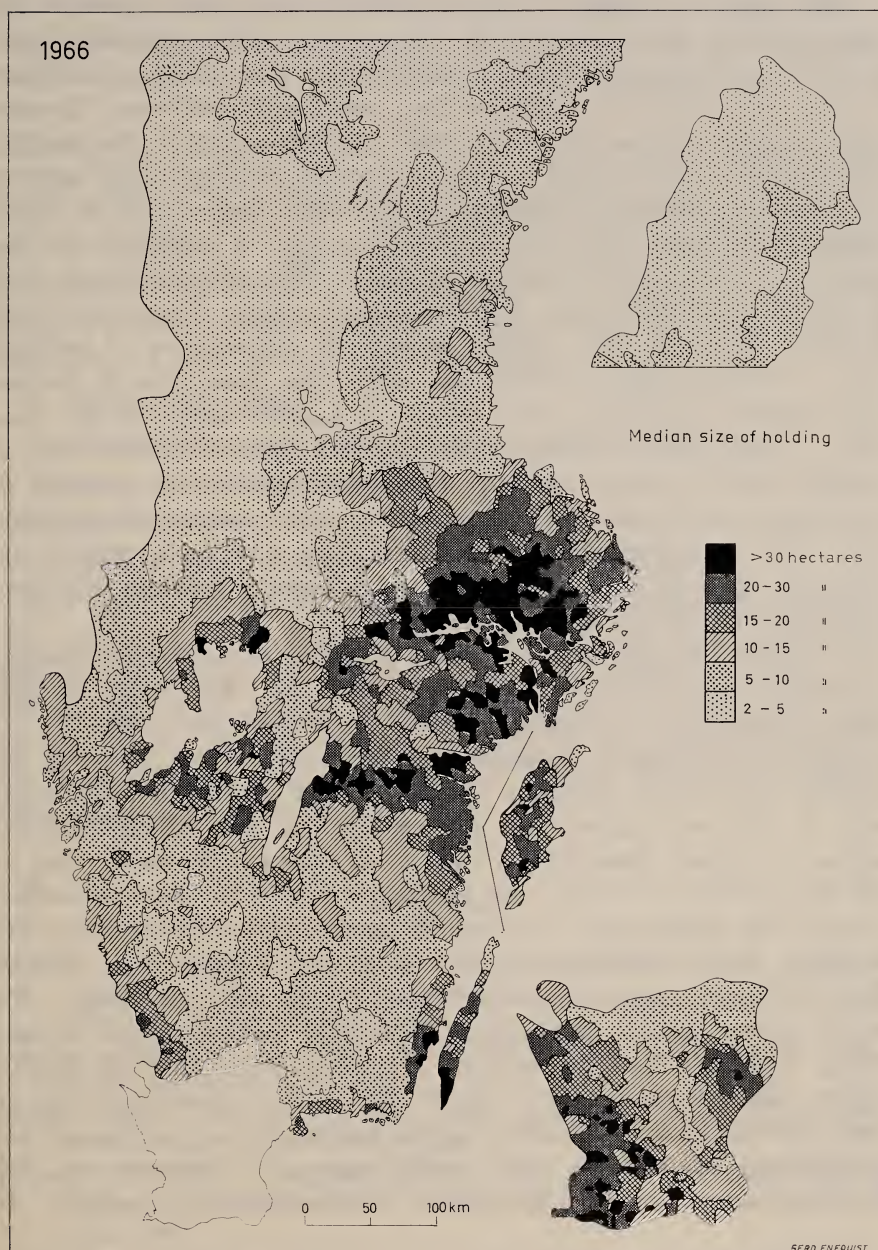


Fig. 7. Median size of holding in 1966.

The maps 5—7 allow a more detailed comparison between the distribution of size classes in the years 1951, 1961 and 1966. First of all we can insert that the distribution of the median size classes in 1951 and in 1956 (unpublished map) are about the same. We can thus consider the periods 1951—1961 and 1961—1966 to be roughly comparable. Parishes with a median size of holding of 50 hectares or more have increased especially in the Mälär region and in Östergötland. They are often surrounded by a ring of parishes with the median size 30—50 and 20—30 hectares. The last-mentioned have increased considerably, e.g. Södermanland, eastern Östergötland and Gotland. There is only a slight increase in the number of parishes with a 15—10 hectare median size while the lower 10—15 hectare class gained considerably from the 5—10 hectare class. In the year 1951 a wide belt of parishes with a 5—10 hectare median size of holding still ran along the hilly boundary between the counties of Malmöhus and Kristianstad separating the rich western half of Skåne from the northeastern half. That belt has now been broken up. Parishes remaining in the lowest class are broadly speaking the same throughout the whole period 1951—1966.

A detailed comparison by parishes in terms of percentage changes in median size of the holdings 1951—1961 has been made in map form and published in a paper (*Statistiska Meddelanden* 1966: V)¹. It is based on the same calculation as mentioned above (for Fig. 3). Stronger percentage increases in the median size of holding occur only in the true agricultural regions, e.g. in The Mälär—Hjälmar region, in western Östergötland and on the island of Gotland. But, as has been pointed out above, the increase is not of the same dimension in all of the regions and, for example, parts of the southwestern plain of Skåne do not reach an increase of 10 %. Further, it is obvious that the forest regions naturally have a very small increase. The south western upland of Småland, Värmland, Dalarna north of Lake Siljan, and the whole of interior Norrland, except for the Storsjö region, have an increase of 0—10 %. In addition, there may even be some parishes with a decreasing median holding size, e.g. in the interior of Norrland and even in some coastal regions. A decrease can also be found rather often in the county of Kronoberg in Småland. In

¹ Due to a regrettable miscalculation some parishes in my Map in "*Statiska Meddelanden V 1966:V*" have been classified as having a median size of holding of 5—10 hectares instead of 2—5 hectares.

combination with a frequent abandoning of holdings, and probably a retarded registration of completed changes, we can notice a very complicate development. This will be further discussed in the forthcoming sheet 127—128 of Atlas of Sweden.

During the last few decades the County Agricultural Boards, guided by the Agricultural Board, have been occupied not only with the task of bringing about an improvement of the individual farms but also in designing a regional division of Sweden according to the possibilities of the farms for economically favourable production. In addition to the common production regions used by the Census of Agriculture a new division has been made as shown below:

1. Agricultural areas.
2. Intermediate areas. (Non-continuous agricultural land)
3. Areas used for forestry.
4. High mountain areas.

A map of these areas is published in Plan 1967:3.

The agricultural regions used by the Agricultural Board were originally constructed by Ernst Höijer and represent one of the best regional subdivisions of Sweden. A new investigation of the agricultural regions of Sweden, based on a careful consideration of all relevant factors, is made by Isak Winberg of the Agricultural Board and based on a series of studies on the climatic regions, soil regions and cultivation areas in Sweden.

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- » — *Jordarts- och uppodlingsområden inom tolv svenska län, med detaljredovisning för Kalmar, Gävleborgs, Västerbottens och Norrbottens län.* (Kungliga lantbruksstyrelsen arbetsgrupp för översiktligplanering. Stencilerad upplaga med 4 planscher och 17 bilder.) Solna.
- » — *Sveriges klimat-, jordarts- och uppodlingsområden. Del V, Sexton län med detaljredovisning för Blekinge, Kristianstads, Malmöhus och Västmanlands län.* Solna.

GRAVEL DEPOSITS IN FINLAND AND THEIR EXPLOITATION

by

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INTRODUCTION

Gravel and sand are important raw materials for construction purposes in growing communities. In Finland, the severity of the winter places special demands upon building foundations, roads, and other earth construction for which gravels are needed to prevent deformation due to frost action. When compared to warmer countries Finland thus needs greater quantities of gravel and has more exacting demands for both texture and purity.

Gravel¹ deposits, especially those of high quality, are not evenly distributed throughout the nation. In addition, human settlement near or upon many deposits either may prevent or limit their exploitation. Yet, due to rapid urbanization, as well as a rapid change from the use of wood to concrete in building construction, and a greatly expanded programme in the widening and lengthening of the national road network, there has been a steady increase in the demand for gravel. In many urbanized areas a scarcity of high quality gravel is about to, or already has developed.

This problem is, in fact, twofold. On one hand, the need for gravel has to be satisfied from sources not too far from the place where it is to be used, since the transportation costs limit the distance it can be moved. On the other hand, extensive extraction of gravel from open pits creates practical and aesthetic problems of land use (cf. Kalliola 1961, p. 11). This is especially notable in the rural-urban

¹ The term *gravel* is used in this text for the sake of simplicity as a collective, including all size fractions from sand to cobbles.

fringe of communities whose built up area is growing rapidly. Several other factors may complicate the exploitation of gravel deposits. They may be associated with terrain features of remarkable beauty, they often are closely associated with settlements, and they may be reservoirs for first-class ground water.

In most of Finland, the main gravel resources consist of glaciofluvial deposits from late-glacial time: radial and transverse eskers, kames, glaciofluvial deltas, and outwash plains. The original forms of these deposits vary greatly due to the local variations of the mode of deglaciation both in space and time. In southern and western Finland, in areas once submerged by lacustrine or marine stages of the Baltic, the original morphology has been considerably altered by the action of littoral forces. In some cases, re-deposition of only the surface layers has taken place, but in areas emerged more recently (and more slowly because of the gradually retarding rate of land uplift), e.g. along the southern coast, re-deposition may have completely changed the topography created by the deposition of the glaciofluvial streams (cf., e.g., O. Granö 1958, p. 20). Thus the morphological elements listed above may be almost anything between flat sand and gravel plains without distinct slopes, and narrow v-crested ridges with steep slopes.

The deposition conditions and the subsequent development are strongly reflected in the texture and structure of the material. From the technical points of view the best gravel is mainly found in bigger sub-aquatic eskers and in glaciofluvial deltas, where the finest fractions (silt and clay) have been well washed away during deposition. Generally small eskers show a much more irregular stratification and a slighter sorting degree, thus limiting the utility of the material. The same applies to kames, in which, however, great local variations of the material occur, and to supra-aquatic outwash plains. The material in its natural state seldom can be used for sophisticated purposes, and thus the gravel has to be sifted. Through mixing gravels of different fractions the appropriate texture can be achieved.

THE RELATION OF SETTLEMENT FEATURES TO THE GRAVEL DEPOSITS

The glaciofluvial deposits occur in different types of complexes, the most important of which are radial esker chains and end moraines (in the big end moraine complexes of Finland accumulations of

stratified drift are more common than till ridges). These landforms have, from earliest times, executed a particular influence upon the origin and development of the cultural landscape. Early settlement was attracted to them, and even today a great many of the churches and parish villages in southern Finland are situated on esker slopes or plains, the cultivated fields lying on the fertile clay, silt, or fine sand deposits surrounding the dry and less fertile esker soils. The explanation for this relation between the settlement pattern and the glaciofluvial deposits is partly to be sought in the *site*, involving ground easy to clear for agricultural purposes, good drainage, and favourable local climate, partly in the *situation*, the esker chains and end moraine complexes having been and still being important communication lines, forming natural road banks, often crossing lakes, and on the whole facilitating traffic across a country with a great abundance of swamps, which form obstacles to travellers and to road building. The early development of important traffic arteries along the esker chains and great end moraines thus contributed to the rise of settlement at profitable sites. Cf. J. G. Granö 1952, pp. 351—354, Smeds & Fogelberg 1967, p. 60, and Bartel 1968, p. 59 ff.

Still today, the less broken glaciofluvial land forms are important as ground for new settlement. As to roads, in recent years engineers have exercised greater independence, and they seldom select routes that strictly follow eskers. Nevertheless, they have to take into consideration the supply of gravel from nearby deposits of stratified drift.

Many eskers, deltas, and other glaciofluvial forms appear on the landscape as forest-covered landforms, which stand out in bold relief. These features often have steep (ice-contact) slopes, and frequently are pitted with kettle holes, in which lakes may occur if their bottom reaches the ground water level. Since many of these landforms lie close to settlement, their pine forest, varying terrain, and frequent vistas from their higher points, have given them considerable recreational value.

A typical example of the present land use pattern at a glaciofluvial ridge in a suburban area is shown in Fig. 1. The ridge in question, Renkomäki, is situated some 5 kilometres south of the centre of Lahti (southern Finland). Its morphology — a somewhat irregular slope with ice contact features (to the north) and a lobate regular slope of almost the same steepness (to the south) — suggests that it is a transverse esker, but according to M. Okko (1962, p. 41), it is to be



Fig. 1. The Renkomäki glaciofluvial accumulation, south of Lahti, southern Finland. Stippled areas indicate cultivated land. Contour interval 10 metres. Only dwelling houses (and public buildings) have been included. Source: Basic map 1 : 20 000, sheet 3111 02 (1963).

considered "a member of a radial esker chain", the present shape of which "seems to be of secondary origin, brought about by wave action." It is composed of washed stratified drift well suited for technical purposes, and it has become one of the most important gravel deposits exploited in Lahti, of which numerous gravel pits bear evidence. At the lower inflexion point of the southern and western slopes is found a belt of dense settlement, mainly wooden one-family houses. Most of the surrounding plains are cultivated. The Renkomäki ridge is forest-covered and it has gained importance as a natural park. On its top there is a dance-floor, and the view is remarkable. Besides its recreational use, the ridge is utilized as a natural ground water reservoir, a pump station of the Lahti waterworks being situated immediately north of it.

It is evident that the gravel exploitation of Renkomäki is in conflict with the other forms of land use. It causes harm to settlement, encroaches upon recreational ground, and will gradually cause deterioration of the ground water through removal of the surface soil

layers which function as natural filters for percolating surface water, and through waste oil from the machinery used for excavation, sifting and crushing. The gravel exploitation has already created an ugly scar on Renkomäki, which is a landform that is clearly visible to a large number of people living in and passing through the area. On the other hand, the rapidly growing city of Lahti needs great amounts of first-class gravel, and this deposit is only one of several within a short distance of the centre of Lahti, which have similar problems.

The Renkomäki gravel exploitation was here treated as an example to show the numerous aspects, tangible and intangible, involved in solving the problems of gravel supply for an urban agglomeration. It is understandable that these problems are increasingly attracting the attention of town and regional planners. Cases similar to Renkomäki are frequently found in the hinterlands of other Finnish cities as well; however, few towns are surrounded by such huge gravel resources as is Lahti, lying as it does on the great end moraine of First Salpausselkä, which in the Lahti area (as in most other parts, too) almost entirely is composed of stratified drift.

Fig. 2 shows the distribution of glaciofluvial deposits and their relationship to the most important towns in Finland. Among the deposits, the series of major end moraines known as the Salpausselkäs, appear like a system of arches trending in a southwestern or western direction. Perpendicular to these run long chains of radial eskers, mostly oriented parallel with the direction of the ice flow. As only the horizontal dimension of the most important deposits is shown, not the amount (and availability) of the gravel, the map only gives a general idea of the actual gravel resources around the cities. Nevertheless, it becomes evident from the map that several big cities, such as Helsinki, Turku and Vaasa, are situated in areas with scarce gravel deposits, whereas other ones, situated along the Salpausselkäs, like Lahti, Lappeenranta and Joensuu, are surrounded by extensive deposits. In Helsinki, the local gravel deposits have been all but exhausted, and today most gravel is transported by road from Tuusula, Ojakkala and Nukari, a distance of up to 50 kilometres. About a quarter of the gravel used in Helsinki is brought by small vessels from the Vessö esker in the archipelago of Porvoo east of Helsinki.¹ In the decade of

¹ According to information received from the firm Lohjan Kalkkitehdas in Helsinki.

the 1950's the proportion of water to land transported gravel was much greater, about two thirds (O. Granö 1958, p. 30). Also, in Turku, the depletion of gravel deposits in the neighbourhood of the town has forced builders and other consumers of gravel to look for resources farther away (Ohlson 1958, pp. 28—29).

The map shows that huge gravel deposits are found far from bigger agglomerations, for example in Lapland. Although many of these can be utilized for highway construction, most will continue to remain unutilized for years, with the possible exception of small-scale exploitation from minor pits for rural building and filling purposes.

GRAVEL CONSUMPTION

Published official statistics related to the use of gravel in Finland is rare. Inquiries were therefore made to institutions representing the most important sectors of consumption, *viz.* the National Board of Public Roads and Waterways, State Railways, and the Cement Association of Finland. Direct information was received from the two first-mentioned institutions, whereas from the last, the amount of cement sold annually in each statistical region was obtained. The gravel consumption was estimated on the basis of these values.

Fig. 3 is a cartographic representation of the results of the inquiries. In order to avoid annual fluctuations of consumption, the annual average for the three-year period 1964—1966 has been represented on the maps. When viewing the maps it becomes immediately apparent that out of these sectors of consumption, road construction and maintenance requires the greatest quantities. Only in Uusimaa (the county around Helsinki) does consumption of concrete gravel equal consumption for roads. The regional distribution of consumption of the particular sectors shows different patterns. The use of concrete gravel reflects mainly distribution of urban population and the intensity of building activity. In the north no doubt the construction of power stations augments the amounts used. Map 3 shows a much more even distribution pattern. However, when comparing the circles it

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Fig. 2. Glaciofluvial accumulations (black) according to V. Okko (1964), and towns (also market towns) with more than 10 000 inhabitants 1967 (stippled circles; several towns situated close to each other have been combined).



must be taken into consideration that they do not refer to areas of equal size. Thus the northernmost circle refers to approximately the same land area as the six southernmost circles combined.

The annual average of the period 1964—1966 for the whole country, with the exception of the province of Åland¹ is distributed as follows:

	m ³	%
Gravel for concrete	8 660 000	21
Railways	2 500 000	6
Public roads: maintenance	10 500 000	26
construction	19 100 000	47
Totally	40 760 000 m ³	100 %

If the population of 1965 is used as the reference level, the annual consumption is 8.9 cubic metres per capita. In the sub-regions, considerable variation occurs, as shown by a few examples below. Since road gravel forms the bulk of gravel consumed, there is an obvious correlation between the per capita gravel consumption and the per capita length of public roads:

Road district	Gravel, m ³ per capita	Public roads, m per capita ¹
Uusimaa	5.3	5.0
SE Finland (Kymi)	9.8	11.1
South Bothnia (Vaasa)	7.2	17.2
Northern Karelia	13.3	20.9
Lapland	16.7	29.8

It must be noted that the figures given include only certain sectors of gravel consumption, however, the most important ones. Figures representing the *total* consumption would be much higher. Unfortunately data for the entire nation, which would enable calculation of the total consumption, are very difficult to obtain. The most important sectors omitted here are communal and private road construction and main-

¹ As a largely self-governed area Åland does not belong to the realm of the National Board of Public Roads and Waterways, and thus information about the consumption of road gravel in Åland was not included in the data received from this institution.

¹ According to SVT XIX: 80, p. 29.

tenance, and different filling purposes. The share of communal and private road construction and maintenance has been calculated for an area including the towns of Lahti and Heinola and twelve surrounding rural communes to be 14 per cent of the total gravel consumption, filling material not included (Fogelberg 1967, p. 24). The share of gravel used for filling purposes is considerable, mainly in urban communities. In the county of Kopparberg, Sweden, it has been calculated to be 27 per cent of the total gravel consumption (Olsson 1962 b, p. 16). As shown above, provincial figures may differ greatly from the national average, and thus it is impossible to apply these figures as such to extrapolate the total gravel consumption. To attain a rough minimum for this, a calculation has been made here presupposing that the share of communal and private road construction of the total gravel consumption is 5 per cent and the corresponding value for fill is 10 per cent. Thus calculated the total yearly consumption would rise to 47 670 000 cubic metres or 10.4 cubic metres per capita. V. Okko (1961, pp. 30—31) estimated roughly 30 million cubic metres of gravel to have been excavated annually during the latter part of the 1950's. Despite the fact that both figures are only intelligent estimations of consumption which cannot be juxtaposed uncritically, it becomes obvious that the consumption of gravel is rapidly rising in Finland, a fact also indicated by the diagram Fig. 3 d.

In Sweden, pessimistic reports have already begun to be released with regard to the near future (20—25 years) of gravel supplies in the southern and central portions of the country (see Olsson 1962 a, p. 167). In general, the Finnish situation seems to be much better, but even here the gravel problems of densely settled areas will soon become more intense, because of both rising consumption and increasing respect for aesthetic and nature conservation circumstances, which will exclude the use of many deposits.

HOW TO LESSEN DAMAGE TO THE LANDSCAPE WHILE CONTINUING TO EXPLOIT GRAVEL DEPOSITS

The theme of this section once again touches the two main problems of gravel exploitation, problems which have only in the past few years been recognized. Previously, because reserves often were believed to be inexhaustible, waste was a frequent feature of exploitation (and it

still is in many places). In this respect a parallel can be drawn between it and the more publicized problem of lake water pollution in Finland. Still after the Second World War many people could not imagine that severe water problems could arise in the country of "the thousand" lakes, and little to nothing was done to purify spill waters before they were let out into the lakes.

The first step necessary for the solving of problems concerning resources of the earth is to inventory them. In Finland, the first general surveys of local gravel deposits were made by Virkkala (1946) and Ohlson (1958). Later, in the 1960's, there have been several more detailed inventories (most of these have not been published). Some of these later inventories include not only regional estimates of the amounts of gravel but also a classification of the deposits according to their value as landscape objects (i.e. Fogelberg 1967).

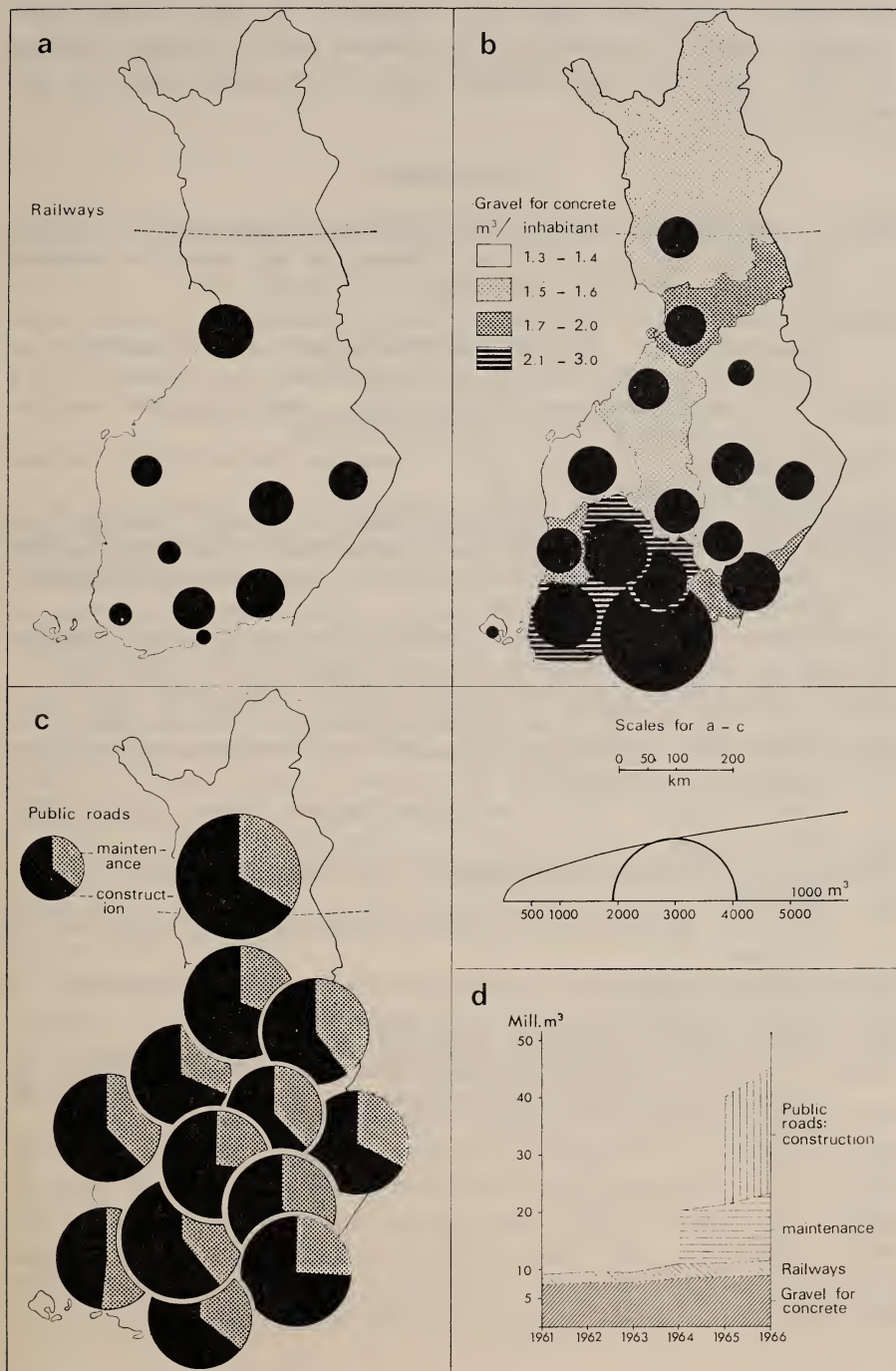
An inventory of the gravel deposits helps the regional planner in several ways. Of greatest importance is the fact that it may lead to the development of larger deposits, deposits of higher quality, and those where damage for other human uses, productive or recreational, will be minimized. The absence of laws with regard to the excavation of gravel has contributed to wasteful exploitation as well as considerable damage to the landscape. At the present time a law controlling earth excavation, requiring authorization for each project, is under preparation (Luonnonsuojelua koskevan... 1966). Such a law (an equivalent of which already has been enacted in Sweden) would control both gravel exploitation and the use of the ground after exploitation has terminated. If the present generation wants to preserve the distinct character of Finnish natural landscapes, in which glaciofluvial landforms constitute an integral part, something must be done to direct gravel exploitation to deposits suitable for this purpose. The best solution to this problem would be government legislation. Before the

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Fig. 3. Annual consumption of gravel (as an average of the period 1964—1966).

- a: State Railways (each rail district).
- b: Gravel for concrete (each statistical region), absolute quantities and per capita.
- c: Construction and maintenance of public roads (each road district).
- d: Diagram showing the development of gravel consumption in the whole country.

Source material: see text.



government authorities begin the regulation of gravel exploitation, complete regional inventories of the nation's gravel reserves, classified by their value from the aesthetic and the economic point of view seem advisable.

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FUNCTIONS AND PHYSIOGNOMY OF TURIN

by

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In my opinion, it is interesting when studying the history of a town, to assess the manner in which history itself, in different periods, gives it different aspects. In other words, the history of a town can be examined geographically through the impression that its different functions have left on the town itself during the course of time.

Obviously, no one town has had the same importance as another. Each town in time has been subject to different impulses, and its activities have become diversified. There are drab towns, towns whose history has been that of modest and limited functions, other whose functions have been of vital interest.

A town is born, I should say, to fulfil a definite purposed, although during the course of time it may assume other purposes, other functions. It can develop other opportunities within the scope of what nature and history have to offer.

Undoubtedly our town is not amongst those having the greatest number of functions. Nevertheless, I dare say, those it has assumed have contributed to differentiating it substantially from other towns in our Country.

We shall make a quick summery of its history and layout, to show that the functions assumed by Turin throughout the centuries have, I repeat, left their seal on its structures and physiognomy. First of all, let us place it in space and in time ever since it was a tiny village, created between the river Po and the river Dora, on a high terrace that afforded it immediate protection. As it was placed at the end of the Susa Valley, one of the most ancient means of communication

between Central Europe and Italy, and one of the ways open to invasions from Gaul and situated on the narrow corridor separating the hillside of the Morainic Amphitheatre of Rivoli from the Turin Hills, it must have a remarkable military and strategical importance ever since the beginning. In fact, when Hannibal (whatever itinerary he chose to enter Italy, this being a controversial subject which has never been fully clarified yet) reached the fortified hamlet of Turin, he met with fierce resistance. In effect Polibius called it "*Polis barutate*" "the extremely strong town". Its resistance checked Hannibal's advance on Rome for several days. But what could the little fortified hamlet do against the Carthaginian leader's elephants and formations?

Resistance was fierce, but Hannibal certainly conquered Turin even though he did not destroy it, and passed further on. When Rome occupied Turin and made a town of it, during its expansion to the North, what model was used for its layout?

That of the "*Castrum*", the military camp, squared into "*insulae*", around the two perpendicular directions of the "*cardo maximus*" and the "*decumanus maximus*".

Ever in this first ancient form of a *castrum*, Turin already reflects functions that Rome gave it, that is of an important seat of Headquarters, of supplies for the troops that were to keep Gaul in tight contact with Rome.

It was along the road through the Susa Valley called "*qua maximis itineribus*" by Caesar, that Gaul could be reached from Rome. At the bottom of this great valley, Turin was to be, I repeat, the seat of Military Headquarters and a supply Centre for the troops travelling through the impervious and hazardous Alpine crossings of those days. In effect we still have plaques and archaeological remains that witness this military and strategical function of Turin. We also have, significantly, plaques witnessing the effect of this function having been that several citizens of Turin — amongst whom a Quintius Glinthus who distinguished himself as a commander in the Danubian Regions — reached the higher grades of military hierarchy.

The acceptance by its inhabitants of the town's functions gives an insight on the character that both will maintain for centuries to come.

The town maintained the same military and strategical functions even after the fall of the Roman Empire. This significant fact proves that, despite the changes to the political conditions of the country, the strategical and military functions of Turin remained unchanged, it

being evidently deeply rooted in its geographical situation with regard to Gaul above all. Then the Goths and the Byzantians built centres of resistance in Turin. After this fall, the Longobard Duchy and the Frank County elected their seat in Turin, in view of the town's eminently strategical and military features. This continues the history of the town till its fortunes start due to its connection with the House of Savoy.

But for a long period of time — I repeat — despite the fall of the Roman Empire and even under the subsequent invaders of Northern Italy, the town still has a prevalently strategical and military function. This does not mean that it did not assume other functions as well. It became the seat of a bishopric at the head of a Diocese. Furthermore, in this period the town remained for a substantially long time, to the middle of the 14th and 15th Century, as agricultural market centre.

The 1341 Statutes of Turin that reproduce a previous state of affairs show that most of the town consists of thatched roof houses built, of badly paved streets left abandoned in most cases and used by the flocks of sheep and herds of cattle coming and going to and from Turin and the surrounding communal grazing grounds. The roads are used even by the pigs and geese that the inhabitants of Turin raise in the courtyards of their houses. In other words the town has a typical countryside air and the Statutes also mention the fact that besides the pastures and fields around the town, also the vineyards on the hillside facing Turin represented a substantial source of income. For a long period of time the military function and this agricultural atmosphere made up, so to say, the normal and usual air of Turin, at least up to the days when a certain movement and richness animated the town. This was the effect of the great commercial traffic instituted between the East, our ports of Venice and Genoa, the Fairs in Provence in Champagne, in Flandres and even faraway England.

The institution of this communication repropounded to Turin a commercial function which in the past it had only had to a very limited extent, but which now takes on a noticeable importance. What are the reasons for this? Being situated at the bottom of the Susa Valley, Turin was necessarily crossed by the caravans of merchants travelling from Genoa and from the other ports of Liguria above all to the fairs mentioned above, carrying the products of Oriental industry and handicrafts to Western Europe.

This is the period during which the towns of Southernmost Piedmont were founded.

Turin becomes a most important road junction. In fact during the 13th and 14th Centuries Piedmont is afflicted by harrassing struggles for road supremacy in which Asti prevails for a long time.

Both Asti and Turin want the passage of caravans for the Susa Valley as it is most convenient for the toll taxes levied on the hillside at Montosolo on entering Turin and at Avigliana on leaving the town.

The commercial development of Turin made it a precious prey for the House of Savoy, who as "Concierges of the Alps" had expanded in Savoie and Dauphiné, till the ever rising pressure from the dominant forces of France, had obliged them "its shoulders to the wall" (the wall of the mountain barrier) to expand into Italy and be concerned with the affairs of this country in order to ensure their own protection.

And their function of rulers of the Alpine passes such as the Mont Cenis and the Mont Genevre, could only be assured by the conquest of Turin.

The struggle of the House of Savoy against Asti is a struggle for the ways of communication for the town, but above all for the commercial domination of this most important area.

In spite of all this, the town remains small, development is quite limited. Just in 1417 the populations of Turin is 4200, that is decidedly less than Fossano, Savigliano, and Mondovì. This means that none of its subsequent functions, commercial, ecclesiastical and cultural (this latter function having just appeared) manage to enliven the town and make it more active. Even traffic and tall taxes fail to achieve this. Beside tall taxes there is another source of income which should be remembered because of the town's geography and physiognomy: flour mills. I have already mentioned that Turin was then an essentially rural centre even in its appearance itself. Well, most of the town's income was agricultural too. It was from the waterways built into the left bank of the river Dora that the Torinese obtained their income obliging the population of the surroundings countryside to bring their corn and grain to the flour mills erected there. It is of great interest to trace the history of Turin on its markets which were already specialised and which have remained active practically to our days.

The herbs market on the piazza of the Town Hall, the cereals market (which was moved several times from Piazza San Carlo to Via Alfieri), the wine market which was held in the square that later became Piazza Carolina; these were all specialised markets that witness the agricultural and commercial importance of our town and the remainder

of which is the present market held in Piazza Bodoni on Thursdays. This is an agricultural market where samples of grain, corn and wine are exhibited by the sellers. Therefore contracts are still made publicly in the square in the same tradition as centuries ago.

At a certain point what I had mentioned before, happens the House of Savoy, pressed by the French King both in Savoie and the Dauphiné, are compelled to try to resist on the Alpine passes to Italy but they cannot. Attracted by the economic development of the plain and by the fact that Turin, very important from the point of view of strategy, has acquired a certain importance as to commerce and agriculture, the House of Savoy descend on Turin, which they conquered definitely, and even make their capital of it, abandoning that in Savoie. This occurred under Emanuele Filiberto.

Moving the capital from Chambéry to Turin gives this latter town the political function which added to its military function determines its destiny to say up to our days.

The town is small, but under Emanuele Filiberto it becomes larger. How does this come about? With the Citadel, one of the most beautiful monuments of European military art, that witnesses the importance the Savoy Prince gives to the town, from the point of view impressed on all the town.

With the wonderful monument, and other sections of the town, one could say that all the town takes on a military phisionomy. This of course was helped by the layout itself of the streets and dwelling as a "Roman Castrum".

The Princes of Savoy leave this huge chessboard, the ordered hierarchy of roads, unchanged. The town expands on the ancient plan. One of the three main enlargements is the military quarters at the end of Corso Valdocco on the corner with Via del Carmine. Those magnificent quarters by Juvarra are a magnificent monument from the architectural point of view and again satisfy and reproduce the military requirements of the town.

And all the roads created by subsequent enlargements, Via Po, and more recently Borgo Po, give Turin an orderly military and uniform impression. All the houses have the same height and are rigidly aligned like the old Piedmontese battalions. "Passing along the roads one involuntarily thinks of the discipline of the old Sardinian Army, the old military habits of the inhabitants" (De Amicis).

The military aspects of Turin are, so to say, solemnised by the mastery and art of Juvarra, by the baroque style. But here too this was not a coincidence: a scholar of art has said that in Europe, Baroque is tied with absolutism, to royal pomp. At Turin, the Princes of Savoy found in the Messinese Artist Filippo Juvarra, the proper person to express Royal pomp close to discipline, to order, to the orderliness of the houses. The sometimes really bizarre art of Juvarra is royal, pompous and rich (think of Palazzo Madama).

This will explain why a poet once spoke of "Royal Turin". Turin reflects not only a military function, but also a first seeing dynasty that little by little creates the proper background to reach the unity of Italy.

This is not all. The Princes of Savoy try to make Turin an industrial town, reaching back to a strain of industrial vocation that the town has had ever since its Roman days. We can follow this industrial vein of Turin, by thinking of the wine jugs found near to the Pretorian Gate, the cotton mills, the flax and oil shops and the first mechanical workshops in Borgo Dora for mechanical power.

The princes of Savoy continue this function by attracting or trying to attract from elsewhere what we to day would call economic operators, and above all technicians for the glass-making and textile industries, promising and giving special privileges.

These industries flourish here and there. The older ones are inside the town limits, Borgo Dora is outside. The industries founded in the 17th and 18th Centuries are situated within the town limits and their function, we must not forget, is that of Government controlled industries. That is to say some workshops have a social function, as we would say today, to find work for the unemployed, to the people whom war and the poverty of the surrounding mountains (and especially those of the Susa Valley) lead to Turin. These are the reasons for all the 17th and 18th Century Beggar Laws that often led to building textile workshops for military cloth. We must not forget that the military function of the town is still apparent in this branch of industry and we shall see where it leads to. We must also not forget that Biella itself is in function of the cloth makers supplying the small army of Savoy State, whose importance became paramount because of Piedmont's function between Spain and France, and later between France and Austria, and that was obliged to keep up an extremely vigilant and agile instruments

for its own defense. The State of Piedmont is an earthen vase hemmed in by two steel vases, and the able and audacious policy of the House of Savoy is to take advantages of the geographical position of Piedmont and transform Turin into a fortress. A strong army is needed, whence the military function I have been mentioning all the time.

Not even industry was able to change the face of our town. It was a lean and troubled industry because it was enforced.

The "Albergo di Virtù" or "Hotel of Virtues" is still today living proof of the pains our sovereigns took to create these workshops and industries for the upkeep of *the paupers* as they were called. But, I repeat, despite invitations made to economic operators and technicians from abroad, despite the creation of these workshops, the 18th century town dwindles from the point of view of industry. Its commercial importance too, dwindles with respect to Milan's, whose better geographical position had enabled it to develop the traffic of goods with Central and Western Europe. In this period reinforced its political functions, as the Capital of a State that called Statemen, Ministres, and Ambassadors. Now Turin becomes a centre of hotels, stables, communications.

In the 17th Century the nearly hillside is gradually covered with the villas for the personell and families of the Court, for the foreign Ambassadors who already preferred the fresh air of the Turinese hillside rather than a house in town. From this point of view too, the political function of the town created ties with the hillside at the foot of which it gradually expands, still maintaining in the direction of the streets and the uniformity of its buildings a certain amount of greyness, of uniformity which some travellers appreciated enormously and others disliked, due to the impression of living in a military barracks.

This atmosphere remains inside the town itself in its social stratifications. All social classes were represented in Turin: confectionery makers and retail food shops on the ground floor, the servants in their quarters in the mezzanines; the gentry on the first floor where the Countesses and Marchwesses live; the dentists, the doctors and solitors on the second floor, the third floors are inhabited by the shop-keepers whose shops are on the ground floor. Lastly the attic are occupied by the common laborers, the poor servants, the beggars. And this cohabitation enforced in all the social classes the sense of community and respect for the destiny of their communion homeland of their common

town that was the strength and one of the moral characteristics of the 18th Century Turin.

Gradually the population increases. From the 17th Century onwards it start to become the largest town in Piedmont. It has more inhabitants than Chieri, Fossano and Mondovì; it becomes the first City of the State. And it is, as ever, above all the military and political function of the town that explains this increase in population which obliges the Crown to enlarge for this lines.

Then, at the beginning of last Century, Napoleon's conquest of the town gives a hard blow to that strong military organization, which had lived its finest hour during the famous seige of 1706. I would even say that the overthrow of the town's walls spelt the beginning of the fall of Turin's military function. As the House of Savoy's dominion started enlarging, other towns such as Vercelli and Alessandria, above all, take over Turin's military and strategical importance. On the other hand Turin centers and accentuates its function as the capital town up to the time when — undertaking leadership of the movement towards national unity — it calls exiles form all over Italy.

This spells a period of congestion for Turin during which Turin is actually a synthesis of all our Country. In practice nevertheless, this synthesis does not yet modify either the structure or the atmosphere of the town. This occured when the Capital of Italy was moved from Turin to Florence in 1865 when a crisis, that could nearly he called a tragedy, cost life of aver 100 Turinese killed in Piazza San Carlo during three days of upheavals. It was this that made Turin follow another destiny and take on another physiognomy.

This situation meant the decadence of Turin as a political Centre. Ministries are moved, Embassies leave. The town seems to face disaster. In these circumstances few enlightened thinker, will a fore-sight unequalled the world over gather together and after lenththy discussions decide that Turin is to become an industrial town.

They are to follow the old industrial strain, but not hapharzardly, as it had actually been industry, together with the army, that had caused the creation of a capable metalworking labour force.

The arsenal, tha rifle barrel factory at Valdocco, employed hundreds of workers. Furthermore, at the end of the 18th century Turin had specialized in building those carriages and hackneys that had made town famous all over Europe.

The foundations for industrial development were there therefore.

And without foreseeing that Turin would have been favoured by other circumstances, our forefathers set out the future development of our town stating that industry would be its salvation. And that is what happened.

Naturally the town's appearance changed, partially because of the new richness brought in by industrialization, but also because the times broke the geometry, the uniformity of the ancient town, creating, amongst other things, the transversal Via Pietro Micca, a revolution in the town's layout. With the opening of the wide treelined boulevards that today still witness the town planning foresight of their builders, our town breathes and breaks away from the old conceptions of town planning. Together with the wonderful boulevards, that the French had already started with Viale dei Tigli now Corso Vittorio Emanuele, that from the second half of the 19th Century were amplified, we see the erection of wide areas of villas and elegant houses in the vicinity of Piazza d'Armi (the old exercise ground for Army manouvers) gradually the town takes on a more elegant and certainly richer appearance. But it is differentiated, because little by little industries are being built inside Turin, not envelopping it, and small and medium size workshops are founded. When large industry is created, it is built on the outskirts, and determines the formation of works quarters. Borgata San Paolo was born from the Lancia Company, Lingotto from Fiat. Later Mirafiori itself becomes Fiat. A net differentiation begins to exist between the quarters for the workers of an industrial appearance. This applies to the area of the Barriera di Milano, while other areas of the town, such as Corso Francia, maintain an elegant and residential appearance. Thus the town becomes differentiated without being suffocated by industry however, as the workshops and industries are disseminated within the town. Except the larger industries that choose the outskirts these applied up to our days when the effect of industrialisation has brought about the decentralisation that is occuring now.

We must however underline the reasons why our town could so easily satisfy the requirements set out by our predecessors. Undoubtedly Turin was led to industrialisation by physical factors, and above all, by the presence of that electrical power that the town could get cheap from its very shoulders, with the general stations of Venalzio and the Martinetto, amongst the first in Italy to give impulse to industry.

The old metalworking industry found in the car industry its natural field of expansion, as also the coach working industry. The small local

industries, such as confectionery, textiles and wool, expanded gradually and occupied whole areas inside the city limits until the population explosion of the second afterwar caused by industrial expansion and mass migration of labour from Southern Italy caused such an increase to the price of urban areas that most industries having stores or deposits in town found it more convenient to sell their old equipment as building areas and to buy cheap land in the nearby communes considered as depressed areas and therefore favoured by reduced rates and transport costs. This started that detachment of industry from the town which has just begun and that will slowly remove from Turin its old internal industrial appearance, so that whole areas will be used as residential areas, new offices and homes, thus creating that city of business inhabited by day, which is starting to exist in the central zones of the town which are still connect, as central offices, to industry.

Part of the old town is occupied by the immigrants from the South, (Via Po, the roads of older Turin). New semiresidential areas are being built on the outskirts, although disorderedly. What counts is that today about 20 to 30 kilometres from the town, industry is creating what we now call, rather improperly, an industrial skirt. Why do I say improperly? The reason is that the expansion of our town is not circular as it might be for Milan, but radial, along Corso Francia, the road to Settimo, the road to Nizza—Piacenza—Genoa, along the road to Orbassano. These are the closest industrial suburbs of the town. However, since these areas tend to be united, it will actually soon be possible to refer to an industrial skirt. Thus a mixed zone of country-side and town is born, in which the town has become the absorbing element of the country. The country side defence consists of the green areas between each industrial plant and the next. It is nevertheless an area whose economic life is dependent on the town and this is why it is called an urban zone. Now we must analyse the extension of this urban zone. We are presently attempting to establish its surface, this being a difficult task as it extends to 30/50 kilometers from Turin. If one considers that there are rural centres in the Asti area, such as San Damiano d'Asti for example, that are becoming industrialised, you can understand how far this wave of industrialisation has progressed. The most important point is to find how local labour and industry move towards the depressed areas in order to be facilitated in finding workers who are more prepared to leave the country and work in a plant.

All these reasons justify the description of Turin as an industrial town and give it an appearance which is radically different from its pacific, quiet and military aspect of years gone by. It would however be a mistake to ignore its geographical location and the beauty of its surroundings and believe Turin to be a sort of huge Rhur, a great mining district of Britain or Poland. Fortunately, in spite of the smog caused by the private houses rather than by the industrial plants, Turin maintains the dignified atmosphere of a non specialised city. What are the reasons for this? It is because it is faced on the one side by the Turin hillside, faced on the other by the Morainic Amphitheatre of Rivoli and surrounded by a wonderful chain of mountains. The landscape itself destroys, or at least modifies the unhuman contribution of industry, and creates an atmosphere which continues to be serene and pleasant.

CONCEPTIONS DU SOUS-DÉVELOPPEMENT RÉGIONAL ET LOCAL EN FRANCE

par

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»Le contraste entre développement et sous-développement n'est [...] pas seulement quantitatif; il est d'abord *qualitatif*, les structures fondamentales qui déterminent ces deux situations ne sont absolument pas les mêmes. Pour ces raisons, le terme de sous-développement ne doit pas être utilisé pour désigner des différences qui, pour l'essentiel ne sont que quantitatives, qu'il s'agisse des inégalités entre des États dont les structures économiques et sociales de base sont comparables ou qu'il s'agisse des disparités économiques qui existent entre les régions d'un même État» (Yves Lacoste, *Annales de Géographie*, n° 418, 1967, p. 653).

»Si nous abordons ces problèmes, c'est que, dans une certaine mesure, le sous-développement existe à des échelons différents et que si, de toute évidence, on ne saurait en *quantité* tracer de parallèle entre, par exemple, le Centre de la France et n'importe quel pays du tiers-monde, en qualité, en méthode, en esprit, on constate qu'il y a des similitudes, des leçons identiques, utiles pour les uns comme pour les autres» (C. G., *Faim & Soif*, n° 70, p. 13).

Peut-on utiliser le même mot »sous-développement» pour caractériser des situations aussi différentes que celles qu'on observe dans le tiers-monde et celles qu'on observe dans certaines zones »défavorisées» d'un pays développé comme la France? Que veut-on dire quand on parle du sous-développement dans ce dernier cas? Voilà les questions auxquelles tente de répondre cet article.¹

¹ Il a été écrit à Lyon où j'étais boursier du Gouvernement français en 1967/68. Je tiens à remercier M. Olivier Dollfus, professeur à la Sorbonne, qui m'a proposé

LES NOTIONS DE DÉVELOPPEMENT ET DE SOUS-DÉVELOPPEMENT

La notion de sous-développement dérive évidemment de la notion de développement — concept distinct du concept de croissance. Voici une interprétation récente des notions de développement et de sous-développement que je trouve intéressante:

Selon Perroux (1964, p. 155), le *développement* est »la combinaison des changements mentaux et sociaux d'une population qui la rendent apte à faire croître, cumulativement et durablement, son produit réel global». Il s'agit donc d'un problème qui »ne relève pas exclusivement de l'économie» (Lacoste 1967, p. 645).

Une *économie développée* serait une économie où le développement est rendu possible parce qu'elle fonctionne efficacement comme un tout. Elle est caractérisée par le fait que »tous ceux qui agissent dans la vie économique sont solidaires: ouvrier, industriel, fonctionnaire, banquier, consommateur, etc... sont en quelque sorte les simples rouages d'une vaste machine» (Albertini 1967, p. 39).

Une *économie sous-développée*, au contraire, est une économie qui ne fonctionne pas comme un tout. Elle est caractérisée par deux traits majeurs: la désarticulation et la subordination.

La désarticulation signifie que »1) l'économie du secteur traditionnel, principalement agricole, est repliée sur elle-même et n'entretient avec les autres secteurs que de rares relations; 2) l'économie urbaine présente les caractères d'une économie moderne, mais elle est dénaturée par sa dépendance vis-à-vis de l'extérieur et la faiblesse de l'effort productif; 3) le secteur des grandes firmes exportatrices forme une enclave économique qui a plus de relations avec les économies développées qu'avec le reste de l'économie [nationale ou régionale]» (Albertini et Auvolat 1967, p. 14).

La subordination signifie que la situation d'un pays sous-développé »est intimement liée aux dominations externes. Historiquement, la désarticulation est la conséquence de l'impact de la civilisation industrielle sur les économies traditionnelles. Celles-ci ont perdu leur ancienne cohérence pour donner naissance à des économies urbaines et à des secteurs gouvernés par les firmes internationales qui ont [...] pris un caractère insulaire [...] Aujourd'hui, c'est] essentiellement

d'étudier les critères du sous-développement, ainsi que MM. Maurice Allefresde, maître-assistant, et Paul Mingret, assistant, qui m'ont aidé à l'Institut de géographie de l'Université de Lyon.

à travers les échanges internationaux que se perpétue la domination des pays développés» (Albertini et Auvolat 1967, p. 18).

Le sous-développement ne serait pourtant pas considéré comme »le plus important problème social et économique de notre temps» (Albertini 1967, p. 15) si la désarticulation et la subordination n'avaient pas pour conséquence une grande disparité des niveaux de vie et une grande difficulté pour élever le niveau de vie des plus pauvres. Il est donc compréhensible qu'on ait d'abord pris conscience des *conséquences* du sous-développement et qu'on ait surtout essayé de mesurer les différences de développement avec divers indices de niveau de vie. D'où la caractérisation de sous-développement comme infériorité, statistiquement mesurable, de quelque chose par rapport à quelque chose.

On a donc défini le sous-développement soit en fonction de conséquences néfastes de diverses »causes», comme »les échecs» ou »l'immobilisme» des gens, soit en fonction de ces causes elles-mêmes (d'après Gendarme 1963, p. 14, »les mécanismes sont les causes mêmes du sous-développement»).

Au nombre de ces conséquences chiffrables figurent les indices de bien-être, qui montrent une grande diversité non seulement entre les États, mais aussi entre différentes régions ou localités d'un même pays. Cela a contribué à la généralisation du terme sous-développement pour désigner certaines zones à l'intérieur des pays développés.

Mais s'agit-il seulement des différences quantitatives entre diverses régions de France par exemple, ou y a-t-il une similitude fondamentale entre le sous-développement d'une zone défavorisée en France et le sous-développement d'un pays du tiers-monde?

Pour pouvoir répondre, voyons quel genre de différences et de similitudes entre ces deux situations ont été constatées.

La principale différence est peut-être liée au comportement démographique. Ce point est mis en lumière par Vieille (1956): »La notion de sous-développement correspond, dans son sens habituel, à la situation des pays coloniaux ou ex-coloniaux. Dans le cadre national existent, de la même façon, des zones assez comparables dans leur fonction, aux pays sous-développés. Mais alors que les pays colonisés avaient pour fonction essentielle de fournir des matières premières aux pays colonisateurs, le pays sous-développé, dans le cadre national, a surtout pour fonction de fournir des capitaux (le réseau bancaire est, ou était, essentiellement conçu pour récolter les économies pay-

sannes: cf Labasse), des énergies humaines (population entre 20 et 40 ans), des énergies culturelles (fuite des gens intelligents). Ainsi, dans le cadre national, la zone sous-développée présente, en particulier, une population vieillie alors que la zone sous-développée coloniale est jeune. C'est pour distinguer la zone sous-développée dans le cadre national, que nous avons préféré la désigner sous le nom de 'zone détériorée'.

Au contraire, les similitudes qualitatives entre la désarticulation dans le tiers-monde et dans certaines zones rurales en France sont frappantes d'après les remarques de Mendras (1956, p. 17):

»La situation traditionnelle des régions rurales [en France] se fondait sur un équilibre et une adaptation fonctionnelle entre la démographie, les ressources naturelles, les moyens techniques mis en œuvre, le système économique dominant et la structure de la société paysanne. Cet équilibre était le point d'aboutissement d'un effort séculaire qui, derrière une stabilité apparente, permettait un lent progrès technique. La diminution de la pression démographique grâce à l'exode rural, coïncidant avec une transformation du système économique dominant, aurait normalement dû conduire à la création d'un nouvel équilibre fondé sur une économie de marchés et des techniques culturelles modernes; et par là, à une élévation du niveau de vie.

»Or, la réaction des campagnes françaises a été tout autre. Dans de nombreuses régions, jusqu'à une date récente, la société s'est figée dans des structures chaque jour plus anachroniques. Et une inadaptation sans cesse croissante conduit leurs habitants à ne plus chercher une solution par eux-mêmes, mais à s'en remettre à l'intervention de la puissance paternelle de l'État.»

On pourrait multiplier les exemples et sur les similitudes et sur les différences entre le tiers-monde et les zones défavorisées de la France. Par exemple, pour »prouver» que le sous-développement du tiers-monde est essentiellement le même que celui de certaines zones de la France,² on pourrait dire entre autre qu'au fond même la situation démographique est analogue puisque dans les deux cas la croissance de la population dépasse la croissance économique.³ Le fait qu'on émigre plus de la zone défavorisée que du pays sous-développé

² Voir la discussion sur »l'essentialisme» et »le nominalisme» dans Popper (1961, p. 26—34).

³ Lacoste (1962, p. 76) définit le sous-développement comme »une distorsion durable entre la croissance démographique et la stagnation économique».

vient seulement de ce que l'émigration à l'intérieur d'un pays est plus facile que l'émigration internationale. On pourrait également dire qu'il existe un état de subordination alarmant dans certaines régions de France vis-à-vis de de l'État ou vis-à-vis d'autres régions et parler comme Lafont (1967) du «colonialisme intérieur». Et on pourrait dire que les différences constatées sont souvent dûes à une différence d'échelle, au fait qu'on compare des nations aux régions, voire aux localités. Dans de telles comparaisons il est normal que certains critères statistiques utilisés au niveau national pour différencier le sous-développement du développement (par exemple sous-alimentation) ne soient pas valables au niveau régional ou local.⁴ Comme illustration, on peut citer une étude de Bird (1956) selon laquelle les péninsules occidentales de la France et de l'Angleterre se trouvent semblables à petite échelle (environ 1:2 000 000), mais fort différentes l'une de l'autre à l'échelle locale.

De tels exemples suffisent à montrer que le débat sur la similitude essentielle ou la différence fondamentale entre le sous-développement du tiers-monde et celui de certaines zones en pays développés est un faux problème, c'est-à-dire «un problème mal posé [...] qui] ne peut être bien résolu» (Sauvy 1949, p. 447).⁵ Car il n'existe pas en soi «des sous-développements» dont il suffirait d'extraire les éléments communs pour aboutir à une définition. Le sous-développement comme «réalité» existe seulement lorsqu'on l'a déjà défini.

Cette définition au sens large du mot peut être conçue (d'après la terminologie de Kaplan 1946) comme un ensemble de spécifications différentes. C'est le devoir du spécialiste de spécifier le sens du terme dans un contexte particulier; celui du méthodologue de réunir ces spécifications pour une définition. Le fait que les spécialistes préfèrent souvent le terme sous-développement à tel ou tel synonyme auquel il a été identifié dans tel ou tel contexte, implique

⁴ Les unités territoriales du «niveau national» sont dans cet article des États (ou autres territoires équivalents); celles du «niveau régional» des divisions de premier ordre à l'intérieur d'un État; et celles du «niveau local» des lieux à l'intérieur desquels se déroule la vie quotidienne d'une communauté (des communes ou des cantons par exemple).

⁵ Selon les résultats préliminaires d'une enquête d'Yves Lacoste (160 réponses classées), présentés aux Journées Géographiques de Bordeaux en mars 1968, 50 % des géographes français jugent le terme sous-développement utilisable et 50 % inutilisable pour désigner certaines zones à l'intérieur de la France.

des liens entre les phénomènes étudiés et de nombreux autres phénomènes. On présume donc l'existence d'une structure, qui selon Boudon (1968, p. 204) est «la théorie d'un système».

Mais quelles sont ces spécifications du concept de sous-développement lorsqu'il s'agit des zones défavorisées de la France?

SOUS-DÉVELOPPEMENT RÉGIONAL ET LOCAL EN FRANCE

Dans la littérature économique, le concept de croissance est assez proche, et quelquefois synonyme, de celui de développement. Il «se réfère [...] aux accroissements de la production par rapport à la population, comme résultant d'une productivité accrue par travailleur» (Hartshorne 1960, p. 18). De ce fait, le mot sous-développement est souvent utilisé pour caractériser les zones en France où la productivité moyenne du travail est faible (p. ex. Bozon 1961, p. 606; Fel 1962, p. 200).⁶

Cette faiblesse de productivité moyenne par tête dans une région peut, en principe, être la conséquence de l'un ou de l'autre des deux faits suivants, encore qu'en pratique ceux-ci soient souvent liés: «Ou bien toutes ou presque toutes les activités de la région ont une productivité par tête inférieure à celle des autres régions du pays; ou bien la région contient une partie disproportionnée d'activités qui ont une faible productivité dans tout le pays. Le premier cas est évidemment celui qui qualifie le sous-développement régional» (United Nations 1964, p. 410).

La faiblesse de productivité par tête est liée à une foule d'autres faits dont il n'est pas possible de distinguer lesquels sont des causes et lesquels sont des conséquences. A une productivité «très basse» sont liés par exemple en Ardèche «un revenu agricole très médiocre,

⁶ Les plus usuels des synonymes ou pseudo-synonymes de l'expression «zone sous-développée» sont: «zone déprimée», «zone détériorée» et «zone déshéritée». Dans certains cas, un de ceux-ci est préféré soit pour que le mot sous-développement puisse être réservé au sous-développement «au sens strict», c'est-à-dire à celui du tiers-monde (p. ex. Kayser 1964, p. 352), soit pour différencier à l'intérieur d'un pays développé les zones en régression des zones sous-développées «au sens même des mots», c'est-à-dire des zones où subsistent des possibilités rentables d'expansion (Pompon 1956 a et b, Klatzmann 1956). Parfois on préfère parler par exemple d'une région «mal développée» pour «éviter quelque querelle de vocabulaire» (Brunet 1965, p. 109).

un niveau de vie incroyablement bas, un retard tant dans l'équipement public que dans l'équipement privé» (Bozon 1961, p. 606).

Selon Fel (1962, p. 196), qui a étudié les hautes terres du Massif Central, le revenu agricole doit remplir deux fonctions. »D'une part il doit rémunérer le *travail* effectué par l'exploitant et sa famille. D'autre part il doit assurer un *intérêt* convenable à l'exploitation considérée comme un capital [...] Ce qui est nouveau c'est l'importance qu'on doit accorder aujourd'hui à chacune de ces deux exigences. Nous sommes [...] au centre du véritable problème du sous-développement: si l'émigration s'entretient d'elle-même, et ne décline pas, c'est bien que la première fonction [...] n'est pas remplie. Si on observe tant de ruines et peu d'investissements c'est sans doute que la seconde fonction (l'intérêt normal du capital) ne s'effectue pas mieux.»

Une basse productivité du travail et de faibles revenus par tête ont pour conséquence un niveau de vie également bas. Or une promotion des niveaux de vie les plus bas semble de plus en plus souvent être considérée comme l'objectif primordial du développement des zones défavorisées. Le sous-développement tend à se confondre ici avec la faiblesse du niveau de vie.

Le niveau de vie est déjà en soi une combinaison complexe. On l'a défini comme »Ensemble de biens et de services dont dispose une personne, une famille, un groupe social ou la population d'un territoire» (Suavet 1967). Selon un rapport des Nations Unies (cité par Ginsburg 1961, p. 2), pour le mesurer il faudrait des critères »choisis parmi une douzaine de composants [...] — santé, nourriture, éducation, conditions de travail, emploi, consommation et économies, transport, logement, habillement, loisirs, sécurité sociale, et libertés humaines». Il n'est donc pas mesurable avec un seul critère. Par exemple, il n'y a pas forcément identité entre dépenses et niveau de vie car »il existe dans certains faubourgs, dans certaines villes des personnes ayant des dépenses élevées de logement pour un niveau de vie médiocre» (Leroy 1958, p. 39), et sans doute aussi, inversement, des personnes ayant de faibles dépenses de logement pour un niveau de vie élevé.

Les critères de niveau de vie varient évidemment selon la conception qu'on se fait du »bien-être». L'idéal serait de savoir mesurer directement le niveau de bonheur. Faute de pouvoir faire cela, on

peut cependant penser avec Fourastié (1962, p. 12) que les bases matérielles commandent largement l'équilibre total de l'homme.

Il est clair que le niveau de bonheur n'est pas uniquement lié à ce qu'on possède, mais aussi à l'équipement culturel etc. dont dispose la collectivité.⁷ Ainsi on a pu par exemple caractériser par le terme sous-développement la banlieue parisienne, sous-équipée par rapport à la ville de Paris. Selon Ullman (1960, p. 28), le sous-développement diffère pourtant de la condition des quartiers pauvres des villes, où »les gens d'une même classe s'assemblent de leur plein gré [...] et où] les moyens d'existence ne sont généralement pas fournis par le voisinage».

On serait cependant tenté de définir le sous-développement en fonction du bas niveau de vie d'une population et de dire qu'il est l'ensemble des facteurs dont dépend à long terme la faiblesse du niveau de vie de la population autochtone d'un territoire qui n'est plus en autarcie économique.

Malheureusement, les choses ne sont pas si simples. Sévérac (1956, p. 4) par exemple écrit que »le Bas-Languedoc viticole [...] peut être regardé comme une région agricole remarquablement développée si on compare des critères tels que rendements à l'hectare, niveau de vie des viticulteurs, techniques utilisées, à ceux d'autres régions agricoles françaises et, par exemple, le Lauragais. Or, l'évolution économique du Lauragais montre une hausse du revenu et un progrès des rendements qui [...] écartent la nécessité d'une intervention extérieure, ce qui n'est pas le cas [...] du Bas-Languedoc.»

Ce qui est ressenti comme problème, ce n'est donc pas tellement la faiblesse du niveau de vie, mais une disparité »entre les niveaux de vie et les niveaux de vouloir vivre» (L. Gachon, cité par Labasse 1966, p. 388). A cela on peut ajouter avec Sauvy (1963, p. 51) que »le bonheur dépend moins de la richesse que de l'enrichissement [...] dans le temps».

Les zones sous-développées ne seraient donc pas seulement des

⁷ Fourastié (1962, p. 15) fait une différence entre *niveau de vie*, qui »se réfère à la consommation de tous les biens et services appréciables en monnaie» et *genre de vie*, qui comprend les éléments non chiffrables, »comme le climat, l'habitat, l'urbanisme et l'environnement de l'habitation [...] et aussi l'équipement intellectuel».

zones pauvres,⁸ mais des zones pauvres où une partie considérable de la population est consciente de l'écart statique et de la différence du rythme d'évolution entre son niveau de vie et le niveau de vie espéré dont elle connaît, par ailleurs, des exemples. Le sous-développement serait l'ensemble des faits fonctionnellement liés à cette situation.

Quels sont ces faits?

Parmi les plus importants, il y a le dépeuplement, particulièrement accentué en France où la croissance démographique a pendant longtemps été nettement plus faible que dans les pays voisins, l'Allemagne par exemple.

Mais comment distinguer d'un dépeuplement normal de la campagne un dépeuplement lié au sous-développement? Ici, il semble que le sous-développement s'identifie au sous-peuplement.

Dans de vastes zones en France, l'exode a non seulement éliminé la surpopulation traditionnelle, mais a eu pour conséquence un état de sous-peuplement. La densité a baissé »à un niveau si bas (par exemple, 5 à 10 habitants au km²) que toute vie sociale de caractère moderne, avec l'infrastructure qu'elle suppose, les écoles, les routes, devient très difficile à entretenir» (Fel 1962, p. 204). Le »seuil minimum de population souhaitable» au dessous duquel cela se produit dépend évidemment »du type de société rurale auquel il doit s'appliquer. Au-dessous de 10 ou 12 habitants/km², une région mise en valeur par de petits exploitants indépendants est certainement sous-peuplée [...] Mais la même densité dans une région de grands domaines n'a rien de dramatique [...]; le coût des services publics y est aussi élevé, mais les agriculteurs ont les moyens d'en supporter une part plus considérable» (Brunet 1965, p. 674).

Ce n'est pourtant pas seulement la *quantité* du dépeuplement qui crée des difficultés typiques du sous-développement.

A ce propos les remarques de Vieille sont intéressantes. Il a étudié la décroissance démographique de quelque 400 communes de la bordure orientale du Massif Central et constate que »plus le point de rupture [le moment à partir duquel la population amorce un mouvement de baisse régulière] est ancien, plus le taux global de

⁸ Klatzmann (1956, p. 3) définit une région (agricole) pauvre comme une région où le niveau de vie des habitants est bas, c'est-à-dire où »les revenus par tête et, a fortiori, les rendements bruts par tête» sont peu élevés.

décroissance [...] est élevé, mais plus il est récent, plus le taux de décroissance par unité de temps, ou rapidité du mouvement, est grand» (Clément et Vieille 1960, p. 111).

C'est la rapidité de cette décroissance, et son caractère récent, qui distinguent selon Vieille (1956) les zones «détériorées», par exemple la bordure orientale du Massif Central ou le Morvan, des zones «prospères». De plus, contrairement aux zones prospères où «l'émigration est en grande partie compensée par l'immigration [...]», la zone détériorée n'est l'objet que d'une compensation très faible». Encore, cette émigration des zones détériorées est-elle discontinue dans l'espace: «on en émigre d'une part vers les grands centres urbains, Paris tout spécialement, alors que les régions prospères présentent des types migratoires relativement continus dans l'espace». D'où le fait que «les migrants de la zone détériorée ont [...] des activités moins agricoles que ceux des migrants des zones prospères». En ce qui concerne l'équipement commercial, la zone détériorée est marquée par une dispersion, la zone prospère au contraire par une concentration.

Au total, Vieille (1956) voit que «la zone détériorée est caractérisée, d'une part, par des contacts locaux réduits qui n'assurent qu'une vie sociale et culturelle dépérissante [...]; d'autre part, par des contacts lointains qui ne peuvent assurer ni la formation des groupes, dont les membres se distribuent à l'intérieur de la zone détériorée, ni l'existence d'une culture adaptée à ses terroirs».

Cette détérioration a souvent été mise en relation avec la faiblesse de l'urbanisation, avec l'opposition: «tissu urbain serré et tissu urbain à larges mailles» (Lefebvre 1967, p. 13). Ainsi Schnetzler (1964, p. 479—480) remarque en Ardèche une corrélation entre le déclin démographique rapide (qui selon Bozon 1961, p. 606, se conjugue presque toujours avec le sous-développement, qui, lui, est caractérisé par une productivité très basse) et la pauvreté frappante en villes: «pas de grande ou moyenne ville, quelques petites à croissance faible avec des baisses temporaires, aucun organisme urbain dynamique [...] Essentiellement marchés ruraux, ces centres ne purent que pâtir de l'exode qui contractait leur clientèle rurale.»

Le déclin est semblable dans d'autres contrées isolées, comme le Morvan dont Bonnamour (1966, p. 413, 235) écrit: «Dans le vide urbain des plaines bourguignonnes et nivernaises, le Morvan pays rural continue à mourir peu à peu. [...] Les friches] s'étendent comme une lèpre.»

Sous-développées seraient donc les «campagnes profondes», pour utiliser l'expression de Charrier (1964, p. 110), celles qui se trouvent au-delà de l'*umland* des grandes villes. Le fait qu'elles n'ont «aucun centre d'attraction» est dû à «la crise du bourg et de la petite ville» abandonnés par les notables (propriétaires fonciers, petits industriels, notaires, avoués, agents d'affaires, etc.) qui autrefois assuraient, «avec ceux du village, [...] la direction économique, politique et intellectuelle du 'pays'» (Mendras 1956, p. 19—22).

Quelle est dans cette détérioration humaine la part des conditions physiques?

Il est clair qu'il y a, statistiquement, des «contraintes» physiques qui tendent à empêcher l'occupation humaine dans certaines conditions économiques. Tel, au niveau local, le relief: un «développement» des pentes, cultivées en terrasses pendant des périodes de surpeuplement, coïncide aujourd'hui souvent avec leur abandon. Un autre, à titre d'exemple: l'altitude. Barruet (1966, p. 30), qui a analysé le comportement démographique entre 1954 et 1962 des quelque 3 500 communes de montagne en France, constate «un dynamisme démographique [...] au-dessous de 600 m où se groupent de nombreuses communes urbaines, et au-dessus de 1 400 m» où se trouvent les stations de sports d'hiver, mais pas dans les moyennes altitudes (cette corrélation est pourtant moins marquée que celle qui existe entre le déclin démographique et la petitesse de la population communale).

Le sous-développement n'a cependant pas été observé que dans la montagne. Par exemple, devant les campagnes du Sud-Ouest de la France, Livet (1965, p. 160) «reste stupéfait de constater que la paupérisation [de l'agriculture...] atteint partout la même ampleur, quels que soient le système de cultures, la nature du terrain, l'allure du climat». Il lui paraît évident que «cette homogénéité dans la pénurie dépend beaucoup plus des attitudes des hommes que des contraintes du milieu».

Selon Clément et Vieille (1960, p. 114), «les régions agricoles aujourd'hui évoluées ne semblent pas avoir été dans le passé absolument différentes des régions aujourd'hui détériorées». Ils font l'hypothèse que «les retards se sont accumulés au cours des cent ou deux cents dernières années au point que seule une mutation paraisse maintenant capable de les combler».

Les différences dans les attitudes des hommes ont pour conséquence, par exemple dans les campagnes toulousaines, l'apparition en plus de

l'opposition entre «les vallées» et «les massifs de collines», d'oppositions croissantes entre «communes fortes» et «communes faibles». Brunet (1965, p. 684) constate que ces oppositions peuvent n'avoir aucune base physique [...]; c'est la plus ou moins grande proportion de cultivateurs dynamiques qui fait la différence».

Dans ce contexte, les remarques de Fel (1962, p. 217—219) sont intéressantes: «la crise rurale n'a pas éliminé les fermes traditionnelles ou attardées et a fait naître un certain nombre de fermes progressives. Or les exploitations attardées, traditionnelles, progressives, se répartissent sur la carte du Massif Central dans un apparent désordre. Le processus du sous-développement aboutit à une géographie 'par points' en chaque région et même en chaque commune.»

De cette géographie par points, Fel (1962, p. 210—212) donne comme autre exemple la consommation d'engrais: «Les hautes terres du Massif Central apparaissent sur la carte de la France comme le seul ensemble géographique — avec la Corse — où la consommation de principes fertilisants n'atteint pas 20 kilos par an et par hectare de surface agricole utile — terres labourées et prairies [...] Les consommations supérieures à 50 kilos réels (250 kilos à l'ha) sont le fait d'exceptions régionales très localisées [...] et surtout d'exceptions *individuelles*. Nous retrouvons ici ce caractère géographique très particulier des formes de modernisation: elles s'expriment de façon ponctuelle sur la carte [...] il ne s'agit en aucune manière d'une difficulté à se procurer les engrais, mais bien d'une atonie très grave de la demande même à proximité de leur source.»

Des observations analogues ont été faites par un géographe allemand, Meyer (1958, p. 27). Il trouve quant à l'intensité de l'utilisation du sol en France, même dans les départements productifs comme le Nord ou l'Eure, de très grandes différences d'une exploitation à une autre à l'intérieur d'une commune ou d'une commune à une autre. Il lie le phénomène à une faible intensité de l'utilisation du sol en France en général par rapport aux pays voisins.

Ullman (1960, p. 28) attire l'attention sur la même question. Selon lui, bien que le sous-développement soit souvent «nettement concentré dans une partie d'un pays», on constate de grandes différences à l'intérieur des zones sous-développées jusqu'au niveau local où «un village peut être pauvre et un village voisin relativement prospère».

Pour expliquer la concentration du sous-développement dans une ou quelques zones à l'intérieur d'un pays, Ullman (1960, p. 28) se réfère à

»un principe général de localisation dans l'utilisation de la terre par l'homme: *la période critique que constitue tout changement exalte pour la suite du développement les atouts initiaux de localisation*». Ce principe pourrait être responsable du fait que »dans tous les pays d'Europe les niveaux de développement économique tendent à être les plus bas dans les régions les plus éloignées du noyau qui s'est trouvé développé comme le centre principal de l'activité économique, à savoir l'Angleterre et la vallée et les bouches du Rhin» (United Nations 1964, p. 407).

Au niveau local une question fondamentale pourrait concerner »la 'pétrification' relative de la société, la résistance de certaines zones à la pénétration des innovations et des améliorations» (Ullman 1960, p. 29).

Dans un lieu qui se dépeuple, une des raisons immédiates de cette résistance au développement pourrait être le manque d'individus entreprenants. Fourastié (1965, p. 460) dit que »le fait pour la région pauvre d'appartenir à la même nation que la région riche est la *condition optimale de sa ruine*». Il en est de même pour le tiers-monde, qui ne serait pas sous-développé s'il n'appartenait pas au même monde que les pays industrialisés...

CONCLUSION

Le sous-développement est une notion très générale qui englobe différentes situations de non-fonctionnement économique et social soit au niveau national dans les États du tiers-monde, soit au niveau régional ou local à l'intérieur d'un État développé.

En France, bon nombre d'études qui touchent le sous-développement au niveau régional ou local, le spécifient selon le cas avec des caractères comme faiblesse de productivité par tête dans diverses activités, faiblesse du niveau de vie, lenteur d'enrichissement, sous-peuplement, dépeuplement rapide, manque de centres d'attraction, dégradation du paysage et »géographie par points».

Il reste pourtant à savoir quelles sont les combinaisons les plus fréquentes des éléments qui forment ces caractères et comment ils se combinent avec d'autres éléments appropriés; il reste à situer ces combinaisons sur la carte et à montrer comment elles varient avec le temps.

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THE AREAL VARIATION OF THE ARABLE SIZE OF FARMS AND THE AREAL DIFFERENTIATION OF FARMING

by

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INTRODUCTION

The zonality of farming in the worldwide scale is a consequence of the primary differences in the natural preconditions of farming, mainly in climate. Local differences in farming are, further, favoured *inter alia*, by the variations in altitude, soil, and among economic factors, by the variations in the marketing conditions, and in the arable size of farms. Local differences may, moreover, be caused by the farmers' subjective decisions concerning the choice of production systems (see *e.g.* Andreae 1964, pp. 166—9 and 319—42). On following pages the main task is to make clear, how far the areal differences in farming are a consequence of the areal variation of the farms' arable size. This investigation has been carried out in an area shown in Figure 1 which area is situated surrounding the city of Oulu in western Finland.

The data concerning farming here are based on the general agricultural inquiry in 1959. This data material for every farm has been grouped areally within the areas shown by the Finnish basic map sheets and their quarters (Fig. 1). For these farm groups it has been computed the characteristic features of farming as mean values, as well as for the arable size classes of the same groups of farms (Hult 1966, pp. 10—15). The unit areas used here (= the areas shown by the Finnish basic map sheets) suit better to the areal pattern of the investigation than do, for example, the patterns consisting of the areas of communes or villages. This is based on the variations

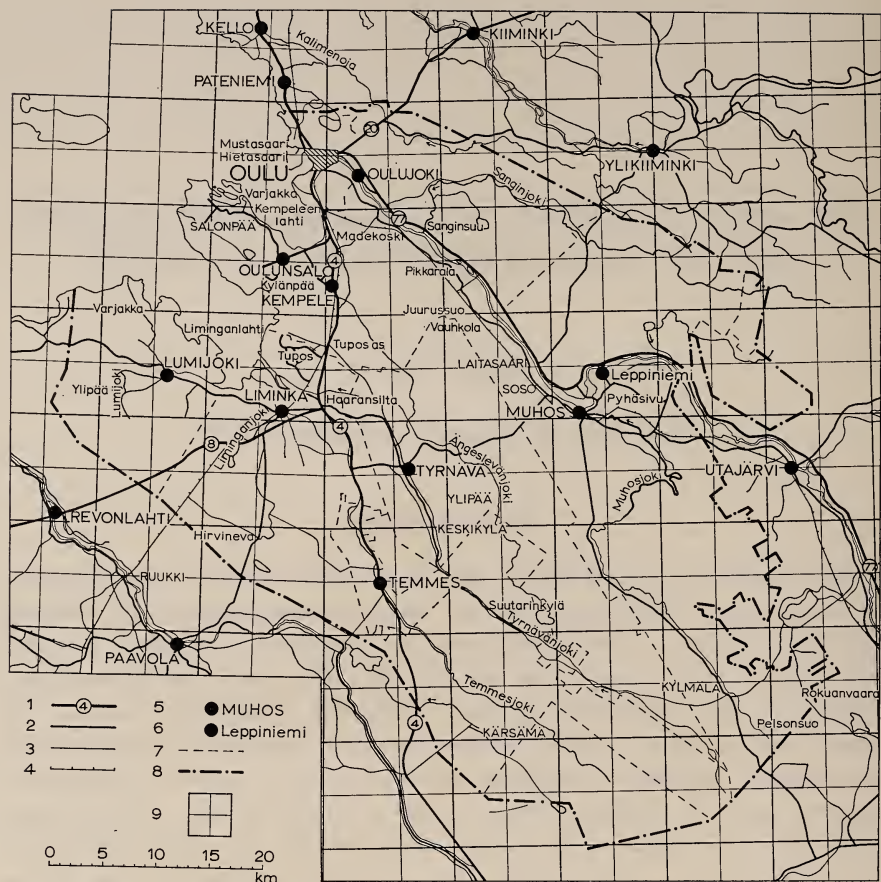


Fig. 1. Area of study. 1) main road, 2) highway, 3) local road, 4) railway, 5) parish centre, 6) agglomerated settlement, 7) communal boundary, 8) boundary of study area, 9) area of basic map sheet and its division into quarters.

of the rural settlement pattern of this area. The big farms are here situated in the river valleys proper. The small farms are, however, relatively more numerous in the sparsely settled watershed areas (Figs. 2 and 3). As even the areas of villages usually extend from the rivers banks to the water divide they consist of the areas of both big and small farms. This being the case the mean values which could indicate the variation of the farm size and its possible results in farming would be unrepresentative of each type of the farm. As we, however, use unit areas which are of regular shape and areal



Fig. 2. Average arable area on the farms, 1) under 5.5, 2) 5.5—9.5, 3) 9.5—11.0, 4) 11.0—15.0, 5) over 15.0 hectares.

arrangement the phenomena in question would present themselves relatively clearly.

The influence of the variation of the farms' arable size on farming has on the following pages been investigated both by the help of the relative extent of ley plants in the arable land of the farms (% of the arable land) and by the help of the relative number of cattle as well (milk cows per 100 arable hectares). These branches of farming are most frequent on the farms here, and both of them comprise the main part of the labour requirement of the line of production in question (Hult 1966, Tables 13, 19 and 24). The random factors have, therefore, a relatively tiny influence upon their areal distribution, and they suit well to the aimed purpose.

THE AREAL VARIATION OF THE FARMS' ARABLE SIZE AND THE RELATIVE EXTENT OF THE LEY PLANTS

According to the northerly location of the study area the arable land use is here characterized by extensive production of fodder (Hult 1966, pp. 92—3). In 1959 the share of the ley plants in arable area



Fig. 3. Frequency of small and large farms. A: proportion of farms of under 5 hectares arable of all the farms, 1) under 30 %, 2) 30—50 %, 3) 50—70 %, 4) over 70 %. B: proportion of farms of over 30 hectares arable of all the farms, 1) under 2.5 %, 2) 2.5—7.5 %, 3) 7.5—12.5 %, 4) over 12.5 %.

of farms was here 54.1 %, that of small fodder grains (oats, barley and mixed grain together) 22.3 %, and that of pasture in arable 12.6 %. The share of ley plants in the arable land will evidently be fixed by the competition of such uses of arable land as cereals, roots and pasture in arable which are more productive uses of arable land but these plants have mostly a higher risk danger than what the ley plants have. Therefore one can easily make out the influence of the variation of the arable size of the farms upon arable farming by the help of the variation of the arable share of ley plants.

The dependence between the arable size of farms and the arable share of ley plants can be stated by comparing Figure 4 with Figures 2 and 3. According to Figure 4 the share of ley plants in arable area is bigger than the average in the marginal parts of the study area where the mean arable size of farms is smaller than the average (Fig. 2) and where the small farms according to the arable area are more frequent than the average (Fig. 3). In the central part of the study area and in Oulujoki area the situation is in this respect reversed. It seems evident that there exists a negative correlation between the arable size of farms and the arable share of ley plants. This dependence

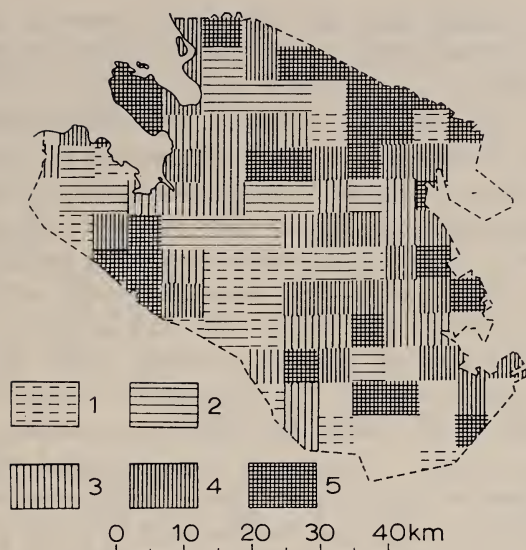


Fig. 4. The area of ley plants as a percentage of the total arable area of farms, 1) under 47.5, 2) 47.5—52.5, 3) 52.5—57.5, 4) 57.5—62.5, 5) over 62.5 %.

is supported by the values shown in Table 1 for, according to these values, the arable share of ley plants is markedly bigger on the small farms than on the large ones.

Table 1. *Ley plants: proportion of arable area (%) and frequency of their cultivation (%) by arable size classes of farms, by distance zones, and on the average, 1959.*

Arable size classes (hectares)	% of arable	freqy. (%)	Distance from Oulu(km)	% of arable	freqy. (%)
0—2	65.5	81.9	0—10	57.1	89.7
2—5	60.4	96.0	10—20	56.1	90.9
5—10	56.6	98.8	20—30	56.1	99.2
10—15	54.3	99.4	30—40	51.4	96.4
15—20	53.1	99.7	40—50	52.7	95.4
20—25	53.4	100.0	50—60	57.7	94.6
25—30	53.9	100.0	60—70	59.3	97.7
30—50	52.0	99.3	70—80	57.4	91.3
over 50	48.1	100.0	80—90	62.4	100.0
Average	54.1	95.2		54.1	95.2

It is even possible that the dependence between the arable size of the farms and the share of ley plants in the arable land is not the same in different parts of the study area. In the following the dependence in question has, therefore, been investigated within the unit areas used in this study. For this purpose the nine size classes of the farms shown in Table 1 have been united to form three size classes of farms, *viz.* 0—10, 10—25 and over 25 arable hectares. This is done in order to eliminate the effect of random factors by increasing the number of farms which now belong to some of the three size classes of farms (Table 2). Within the unit areas the shares of ley plants in arable for every three size classes of the farms have been counted in a normal way, *i.e.* by weighing the original values of the nine size classes of the farms by respective amounts of the arable area belonging to them. Parallel to these so called real percentages of ley plants there has been counted the so called standardized percentages of ley plants. The latter has been counted by using the mean values of ley plants within the nine original size classes for the study area as a whole, and these values have been weighed by the arable areas of respective size classes of the farms within the unit areas (Table 2). For every unit area it has, further, been counted in the way above the mean real and standardized percentages of ley plants (Table 2). The standardized percentages of ley plants indicate, in fact, the contribution of the variation of the farms' arable size to the real percentage of ley plants, if this factor works in the same way in every unit area. By comparing the variation of both real and standardized percentages of ley plants in the unit areas and within them between the size classes of the farms it is possible to see how far the affect of the variation of the farms arable size has the same results in different parts of the study area.

We see by examining Figure 5 that the changes of both real and standardized percentages of the ley plants within the size classes of farms are mostly the same in different unit areas. That is the case especially in the central part of the study area and in Oulujoki area where there is plenty of arable land and the farms are numerous. In the marginal parts of the study area these changes often have different directions. The mean values of both real and standardized percentages also deviate mostly to the same direction in relation to the mean percentage of ley plants for the whole study area. According to the results above it can be stated that the unit areal composition

Table 2. The calculation of the real (a) and standardized (b) percentages for ley plants to an unit area (cf. Table 1).

Original values			Values for three new size classes of unit farms			Total and mean values for the of area	
Arable size classes of the farms (in hectares)	Total arable area of resp. size class (in hectares)	Percentages of ley plants	Total arable area of resp. size class (in hectares)	Percentages of ley plants	Total arable area in unit area (in hectares)	Percentages of ley plants	
0—2	22.9	a 45.1 b 65.5	815.0	a 56.4 b 57.4	4289.2	a 54.2 b 53.6	
2—5	117.6	a 55.5 b 60.4					
5—10	674.5	a 56.9 b 56.6					
10—15	996.8	a 54.4 b 54.3	2365.8	a 56.0 b 53.7			
15—20	992.2	a 57.4 b 53.1					
20—25	376.8	a 56.3 b 53.4					
25—30	252.9	a 50.2 b 53.9	1108.6	a 49.0 b 50.4			
30—50	278.5	a 49.8 b 52.0					
Over 50	577.2	a 48.0 b 48.1					



Fig. 5. The real and standardized percentages of ley plants. A = a unit area where a = real and standardized value within arable size classes of farms (I = 0-10, II = 10-25, III = over 25 hectares arable land); the area between two named curves is darkened when real value > standardized value, and white when the situation is reversed (the left hand scale); b = mean real and standardized values for the unit area presented as in a; c = arable land area within size classes of farms (the right hand scale, in 1000 hectares). The number of farms is presented in the upper corner of each unit area. B = shore line. C = boundary of the study area.

of the farms' arable sizes evidently affects the areal differentiation of the share of ley plants in the arable land of farms, although its consequences are not exactly the same in all parts of the study area.

There may, however, be some other factors affecting the arable share on ley plants, too. It can be assumed that in the frosty areas

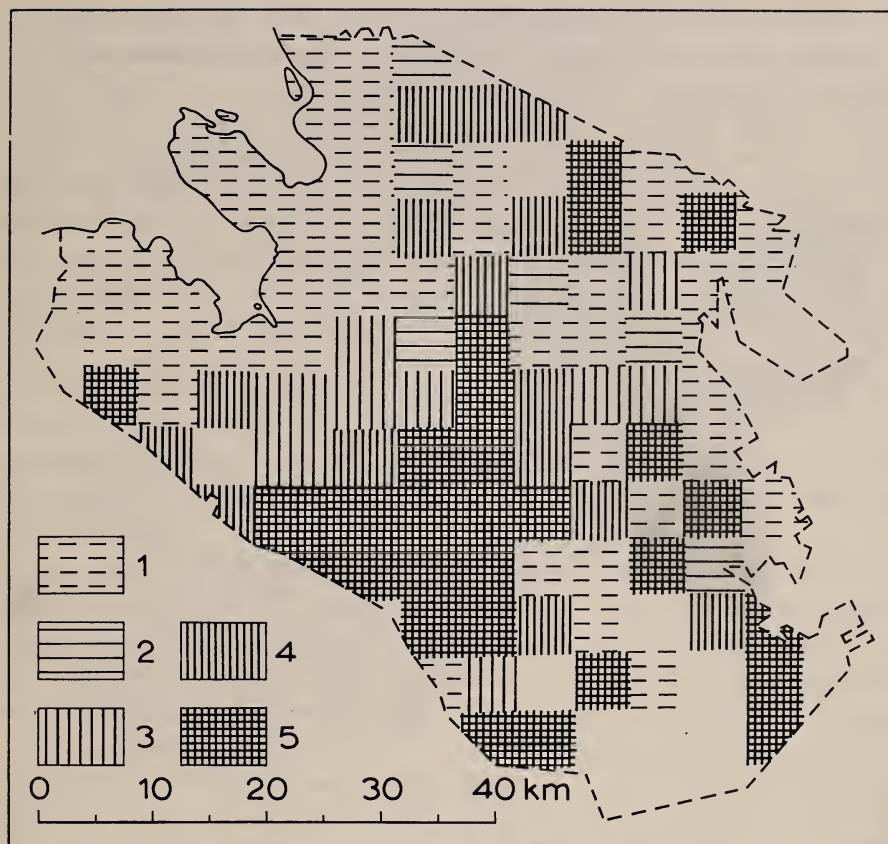


Fig. 6. Farms affected by frost damage as a percentage of all farms, 1959.
1) under 5 %, 2) 5—10 %, 3) 10—15 %, 4) 15—30 %, 5) over 30 %.

the arable share of ley plants would be bigger than the average, for in such areas the ordinary cereals do not thrive very well, and their extent in the arable land has, therefore, gone down. By comparing Figure 4 with Figure 6 it can be stated that in the frosty marginal areas the arable share of ley plants really is bigger than the average, but in less frosty central part of the study area and in Oulujoki area the situation is reversed. It can, further, be supposed that the variation in the qualities of the arable soil such as coarseness, richness of humus and plant nutrients, drainage and the level of ground water *etc.*, mainly natural factors connected with cultivation technique and productivity of fields, could affect the relative extent of ley plants



Fig. 7. Surface soils. 1) clay, silt and fine sand, 2) coarse sand, 3) coarse sand, 4) till, 5) esker material, 6) sedge peat, 7) Sphagnum peat, 8) peat. Small map: I = detailed soil mapping (scale 1 : 20 000), II = generalised soil mapping (scale 1 : 400 000), III = soil mapped in main features. (scales 1 : 1 000 000 and 1 : 2 000 000).

in the arable area of farms. It can be expected that in the areas where there is plenty of cultivated soil of good quality the cereals, which have higher demands even in this respect than the ley plants, take a relatively bigger part of the arable area. A comparison between Figures 4 and 7 supports the above assumption. We can notice that there is arable soil of good quality in the central part of the area as well as in Oulujoki area. In Tyrnävä commune *e.g.*, which is located in the central part of the study area, the average grading of the fields is highest among respective values of the communes which

comprise the study area (see Hult 1966, pp. 18—23, 53—5, Table 6). In these areas the extent of ley plants in the arable area really is lower than the average mainly because of the competition of good arable land caused by the cereals. In the marginal parts of the study area there is plenty of peaten arable land, and because of its generally poor productivity the relative extent of the cereals is lower and that of the ley plants is bigger than the average. It can, further, be assumed that the distance from the city of Oulu could affect the arable land use, indirectly at least. We see from Figure 7 that in the areas closest to Oulu the extent of the ley plants in the arable land is bigger than the average. This has been thought to be a consequence of the fact that the farmers there commonly have subsidiary earnings outside their farms, and this development has led to a more one-sided farming. In these conditions particularly the extent of the ley plants in the arable land has widened (Table 1; Hult 1966, pp. 70, 76, 120—8).

In order to make clear the contribution of the factors above to the areal variation of ley plants in the arable land it has been done correlation, partial correlation and multiple regression analyses. By the help of the correlations it is possible to make out the dependencies which exist between the variables. By using the partial correlations it is, further, possible to get out the dependencies between the variables after the removing of the effects of the other known variables. By using the multiple regression analysis it is, moreover, possible to make out the contributions of the factors explaining the total variation of the dependent variable, as well as the order of importance of the factors in question (see *e.g.* Spiegel 1961, pp. 241—82). In the analyses the dependent variable (y) is the mean real percentage of ley plants in the unit areas (Table 3). The independent variables are the arable size of farms (x_1), the number of farms within the unit areas (x_2), the frostiness (x_3), and the distance from the city of Oulu (x_4). As a variable indicating the arable size of the farms there has been used both the mean arable size of the farms within the unit areas (Analysis a), and the standardized percentage of ley plants as well (Analysis b). It is supposed that the standardized percentage of ley plants could indicate the effect of the arable size of farms more accurately than does the mean arable of the farms itself. This assumption rests on two facts. First, the percentage of ley plants in the arable area fluctuates reasonably between the arable size classes

of farms. Second, the mean arable size of farms may be the same, although it may be formed as a mean of either very small and large farms or such farms the arable size of which is very near the mean value. The mean standardized value takes into account the "background" of the mean, which does not happen in forming the mean arable size of the farms. The number of farms (x_2) is used to indicate the natural favourableness of farming. By comparing Figure 5 with Figure 7 we see that the number of farms is high in the central part of the study area and in Oulujoki area where there are the most favourable natural conditions for arable farming. On the contrary, in the marginal parts of the study area there is plenty of peaten arable soil, the drainage of fields is poor, and there are very few farms. It is, therefore, well grounded to use the number of farms to indicate the natural favourableness of the preconditions of farming. The numerical value of the variable of frostiness (x_3) is grounded on the frequency of the farms experienced frost damage in 1959. The distance from the city of Oulu has been measured along the shortest possible highway route to every unit area, which values has been used as values of Variable x_4 .

According to the correlation matrix (Table 3) the strongest correlation exists between the real percentage of ley plants (y) and the arable size of farms (x_1), among the correlations between y and x 's. This correlation, being negative, indicates that the real percentage is the bigger the smaller the arable size of the farms is. We can, further, notice that the standardized percentage indicates better the influence of the arable size of the farms than does the mean arable size of farms itself, since the correlation between y and x_1 is better in Analysis b than in Analysis a. The correlation between y and x_2 is nearly as strong as the former. This negative correlation shows that the bigger the number of the farms (=favourable natural preconditions of farming) is the smaller the real percentage of ley plants is. The correlations between y and x_3 (=the frostiness), and between y and x_4 (=the distance from Oulu) are weak.

There exist, however, relatively strong correlations between the independent variables (x_{1234}), according to Table 3. One of them appears between the arable size of the farms (x_1) and the number of the farms (x_2). Thus the above correlation between y and x_1 has been affected by the correlation existing between x_1 and x_2 , and the correlation between y and x_2 by the same correlation, for example.

Table 3. Statistical analyses concerning the arable extent of ley plants.

VARIABLES

y = mean real percentage of ley plants
 x_1 = mean arable size of farms (Analysis a)
 x_1 = standardized percentage of ley plants (Analysis b)
 x_2 = number of farms
 x_3 = frequency of farms experienced frost damage in 1959
 x_4 = distance from the city of Oulu

CORRELATION COEFFICIENTS

	x_1	x_2	x_3	x_4	y
	a				
	1.00				
	b				
	1.00				
	a	0.44			
	b	1.00			
	a	0.16			
	b	-0.10	1.00		
	a	-0.01		1.00	
	b	0.19	-0.43	1.00	
	a	-0.56	-0.52	-0.15	1.00
	b	0.65			

PARTIAL CORRELATION COEFFICIENTS

	x_1	x_2	x_3	x_4
	a	-0.34	-0.54	-0.33
	b	0.54	-0.51	-0.45

MULTIPLE REGRESSION ANALYSES WITH TEST VALUES ($F = 1.00$ for entering and removing variable, stepwise procedure)

Standard errors (1) and risks (2) of the partial regression coefficients

Regression equations

Analysis a

Step I $y = 69.4 - 1.17x_1$
 Step II $y = 69.3 - 0.86x_1 - 0.23x_2$
 Step III $y = 75.6 - 0.68x_1 - 0.36x_2 - 1.52x_4$

Analysis b

Step I $y = -66.9 + 2.27x_1$
 Step II $y = -72.6 + 2.46x_1 - 1.10x_4$
 Step III $y = -27.7 + 1.76x_1 - 1.73x_4 - 0.30x_2$

Explanation:

Df = degrees of freedom; F = F-number (or ratio); S = standard deviation of residual terms; R = multiple correlation coefficient; Expl. % = explained part of the total variation of y ($= 100 \times R^2$); b_{x1} —4 = partial regression coefficients.

Df	F	S	R	Expl. %	Constant				b _{x1}				b _{x2}				b _{x4}			
					1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
35	15.7	6.74	0.54	29.0	2.73	.001	0.03	.001												
34	5.37	6.36	0.61	36.9	2.58	.001	0.03	.01	0.01				0.01					.05		
33	7.99	5.79	0.69	47.6	3.25	.001	0.03	.05	0.01				0.01				.01	0.05		.01
35	25.5	6.17	0.64	40.5	25.0	.02	0.04	.001												
34	5.11	5.84	0.68	46.8	23.8	.01	0.04	.001										0.05		.05
33	11.6	5.10	0.77	59.4	24.7	—	0.04	.001	0.0009				0.0009				.01	0.05		.001

These disturbances have been eliminated by using the partial correlation analysis. According to the results of this analysis (Table 3) the partial correlations between y and x_1 , and between y and x_2 are nearly the same. The latter is a bit stronger compared with the normal correlation above, and the former are weaker respectively. The partial correlation between y and x_3 really is insignificant. Meanwhile the partial correlation between y and x_4 is markedly stronger than the normal correlation above. This correlation shows that the extent of the ley plants in arable clearly gets smaller with distance from Oulu.

The linear multiple regression analyses have been made using a stepwise program version (see e.g. Spiegel 1961, pp. 269—71; Efroymson 1965, pp. 191—2). According to the results of Analysis a (Table 3) the mean arable size of the farms (x_1) explains most (about 1/3) of the total variation of the real percentage of ley plants (y). The number of farms (x_2) has entered into the model at the second step, but its contribution to the explanation of the model is very small. The third variable entering into the model, the distance from Oulu (x_4), has increased more than the former the explanation of the model. This can be stated from the diminishing of the distribution of the residual terms (S) within these steps as well.

The standardized percentage of ley plants, which has been used in Analysis b to indicate the effect of the arable size of the farms (x_1), has here proved to be the best factor to explain the total variation of y . The second position in the model has the distance from Oulu (x_4) and the third one the number of the farms (x_2). Both of these have markedly increased the total explanation of the model. The fact that x_2 has entered into the model after x_4 is evidently a consequence of the strong correlation existing between x_1 and x_2 . This being the case the program allows a third variable which is not in a very strong correlation with the first entered variable to enter into the model although the strenght of the ordinary correlations would suggest another order (see e.g. Efroymson 1965, p. 194). As we remember there are no marked differences between x_2 and x_4 according to the results of the partial correlation analysis (Table 3).

According to the results of the multiple regression analyses Variable x_1 , the arable size of the farms, explains most of the total variation of the real percentage of ley plants (y). Comparing the results of the analyses we see that the standardized percentage of ley plants (indicating the effect of the arable size of the farms) explains more

the phenomenon in question than does the mean arable size of the farms itself, as supposed above. Second and third position in this explanation belong to the natural preconditions of farming (indicated by the number of the farms, x_2), and to the variable of the distance from Oulu (x_4). The variable of frostiness (x_3) has no position in the models. This is possibly a consequence of the fact that there are strong correlations between the frostiness (x_3) and x_4 , and between x_3 and x_2 . The latter, x_4 and x_2 , had already entered into the models. In their main features the results of the multiple regression analyses are much like those of the partial correlation analyses, even in respect to the importance of x_3 , the frostiness.

The significance of the results of the multiple regression analyses can be stated from the fact that, according to the F-test, all steps of both Analysis a and Analysis b are significant at the risk of 1 %. The significance of the partial regression coefficients is also good, according to t-test (Table 3). Also the distributions of the residual terms have proved to be normal. Their areal distributions are nearly identical in both analyses. The negative and positive deviations have even areal distribution which shows that the models have a good fit with the observations (Fig. 8).

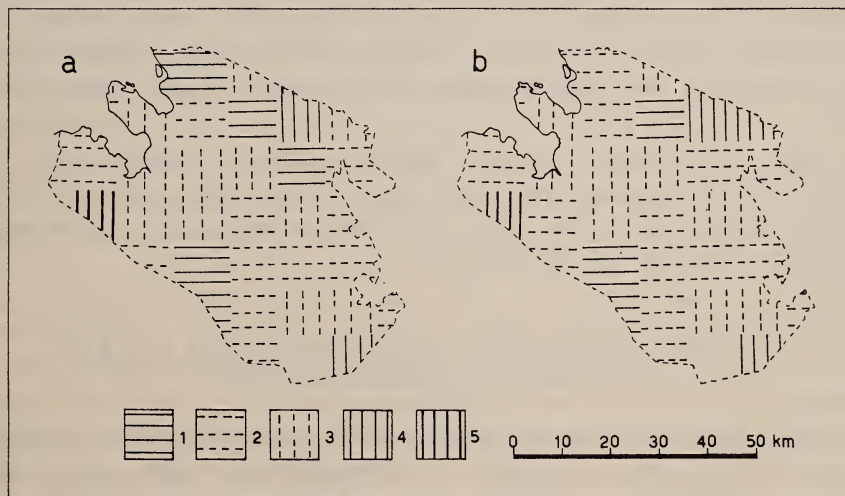


Fig. 8. Ley plants: distribution of residual terms, a = according to the results of Multiple Regression Analysis a, b = according to the results of Multiple Regression Analysis b, 1) -2—-1, 2) -1—0, 3) 0—1, 4) 1—2, 5) 2—3 standard deviations of resp. residual terms (cf. Table 3).

According to the statistical and non-statistical analyses, the arable size of the farms influences clearly upon the areal differentiation of the relative extent of ley plants in arable. This is based mainly on the risks of the arable farming. On the small farms it is important to produce enough fodder for winter feeding of the animals. The extensive production of ley plants suits well to this purpose, since the risk danger is thus very small. The big farms can take a relatively great risks, and this comes into existence through extensive cereal farming and by using a relatively big part of the arable land for pasture. Further, the local natural preconditions of farming basing mainly on the properties of arable soil affect more the extent of ley plants than does *e.g.* the frostiness. This order of importance of these factors can be explained so that the frostiness does not affect so much the competition between ley plants and cereals than between the species of the cereals. The ordinary soil factors, on the contrary, affect evidently most the competition between the ley plants and the cereals, since the latter have clearly higher demands in this respect than the ley plants. The distance from Oulu has also clear influence upon the relative extent of the ley plants in the arable area of the farms. The big share of ley plants in arable land near the city of Oulu can be explained mainly on the basis of the extensive use of subsidiary jobs offered by the city of Oulu for the farm families. As the harvest time of ley plants can be relatively long compared with *e.g.* the harvest time of the cereals the big extent of ley plants in the arable land suits well to this type of economy. Far from the city of Oulu the farmers use their labour mainly in farming, and the arable farming is there characterized by mansideness. Therefore the extent of ley plants has there remained smaller than the average (see Hult 1966, pp. 70, 76, 124—6).

THE AREAL VARIATION OF THE FARMS' ARABLE SIZE AND THE RELATIVE NUMBER OF CATTLE

Cattle farming based on milk production forms the most important sector of the animal husbandry in the study area. This can be seen from the fact that the relative labour requirement of cattle farming forms here more than a half of the total labour requirement of farming, and about 80—90 % of the respective value of animal husbandry (Hult 1966, Table 24). Cattle farming has not, therefore, any competitive

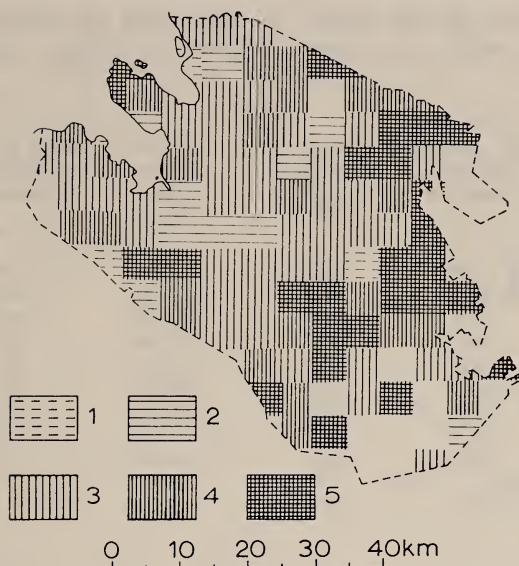


Fig. 9. Milk cows per 100 hectares arable, 1) under 20, 2) 20—30, 3) 30—40, 4) 40—50, 5) over 50.

branch of animal husbandry worth mentioning. This being the case it can be assumed that the influence of the arable size of the farms upon animal husbandry, if it appears at all, comes clear into existence just in the relative numbers of cattle (milk cows per 100 arable hectares).

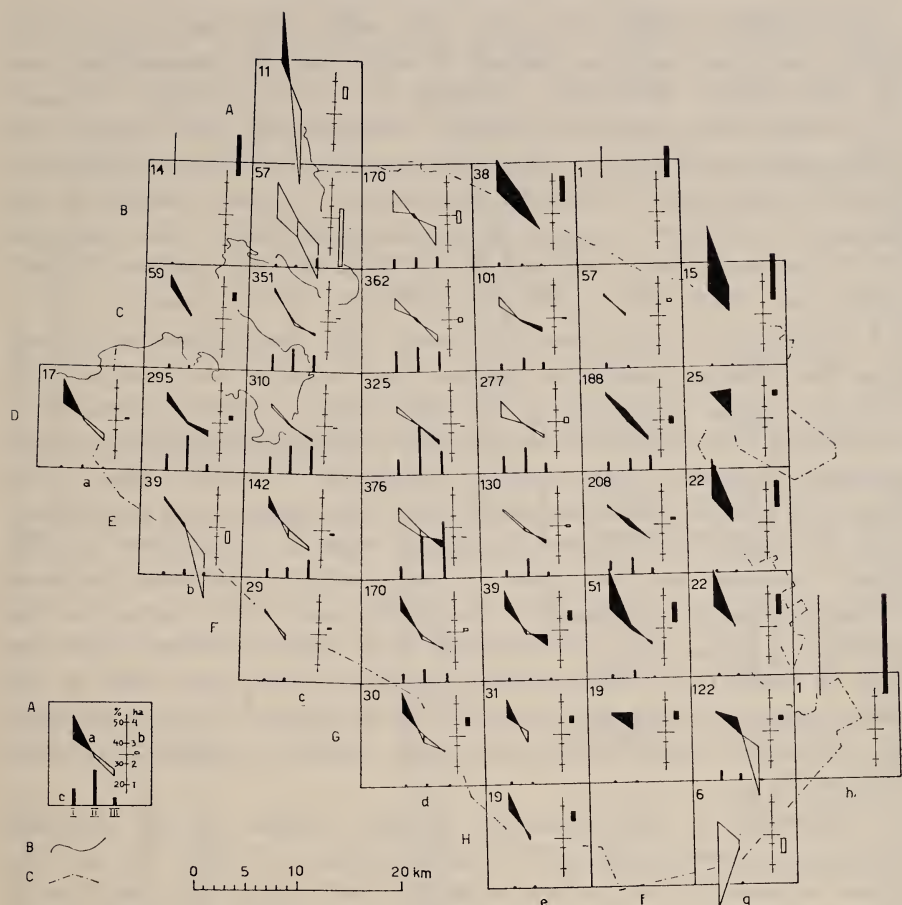
A comparison of Figure 9 with Figures 2 and 3 shows that the relative number of cattle is greater than the average in the marginal parts of the study area where the average arable size of the farms is relatively small, and the small farms are relatively most frequent. In the central parts of the area and in Oulujoki area the situation is reversed in the above respects. There appears then a negative areal correlation between the relative number of cattle and the arable size of the farms. This same correlation can be found by examining Table 4 where it is shown the relative number of cattle within the arable size classes of the farms.

The fact how far the above correlation is true in every part of the study area can be seen by comparing the paired changes of both the real and standardized relative numbers of cattle within three arable size classes of the farms in the unit areas. These values have been

Table 4. Milk cows per 100 hectares of arable land and frequency of milk cow rearing (%) by arable size classes of farms, by distance zones, and on the average, 1959.

Arable size classes (hectares)	Milk cows per 100 arable hectares	freqy. (%)	Distance from Oulu (km)	Milk cow per 100 arable hectares	freqy. (%)
0—2	58.7	36.3	0—10	23.9	47.8
2—5	51.6	70.6	10—20	34.8	71.5
5—10	41.1	83.7	20—30	33.8	76.4
10—15	36.2	90.1	30—40	32.7	78.0
15—20	33.0	93.3	40—50	36.8	78.9
20—25	30.9	95.0	50—60	45.6	83.8
25—30	27.1	90.9	60—70	41.8	80.7
30—50	28.7	97.4	70—80	43.6	74.6
over 50	21.4	94.9	80—90	26.0	100.0
Average	34.4	74.9		34.4	74.9

counted in the same way as was used in the respective investigation of the relative extent of ley plants in arable. We see from Figure 10 that these changes of the values in question have a very good fit with each other nearly in all the unit areas. Further, the mean values of both the real and standardized relative numbers of cattle deviate mostly to the same direction in relation to the mean value in question got for the whole study area. This shows that the arable size of the farms has a very strong influence upon the relative number of cattle. It can, moreover, be stated that the real relative number of cattle is greater than the standardized one mainly in the marginal parts of the study area. In the marginal parts of the study area the natural preconditions of arable farming are poor, and the animal husbandry has, therefore, relatively more pull than the arable farming; this comes into existence as high relative numbers of cattle (Hult 1966, p. 126). In the central parts of the study area and in Oulujoki area the situation is, on the contrary, reversed. Here the natural preconditions of the arable farming are relatively good, and so the real relative numbers of cattle are here smaller than the standardized ones (Hult 1966, pp. 126—7). There are low relative numbers of cattle around the city of Oulu, too. This is based mainly on the scarcity of manpower which is needed continually and plenty in animal husbandry. We see from Figure 10 that the real relative number of cattle is there smaller than the standardized one on the farms which



have less than ten arable hectares. On these small farms the members of the farm family commonly have subsidiary earnings outside the farm (mainly in Oulu) which causes the scarcity of labour in farming and the relatively low number of cattle (Hult 1966, pp. 61—2). The real relative number of cattle is smaller than the standardized one also on the farms of over 25 hectares arable. This is a consequence of the scarcity of paid labour which is needed to take care of animals on these big farms. Here in the proximity of the labour markets of Oulu the farmers are not able to compete with jobs offered in town because of high wages paid there. On the farms which have 10—25

arable hectares there is in some unit areas near the city of Oulu even greater real relative number of cattle than the standardized one. On these farms the labour available in the farm family normally covers the labour needs in farming. Further, the farm family gets a reasonably good living on these farms, and the subsidiary employment is not so necessary. Therefore, the scarcity of labour caused by the extensive subsidiary economy of the farm families or that appearing on the common labour markets do not limit the real number of cattle there (see Varjo 1958, p. 68; Hult 1966, pp. 80—2; Table 4).

According to the statements above it is well grounded to take into the following statistical analyses the variables which explain the influence of the arable size of the farms, that of natural preconditions of farming, and that of the distance from Oulu upon the real relative number of cattle. The variables indicating the arable size of the farms are included the mean arable size of the farms (x_1 in Analysis a), and the standardized relative number of cattle (x_1 in Analysis b). The other variables are the same as was used in analysing the areal differentiation of ley plants in the arable area of the farms, *viz.* the number of farms (x_2), the frostiness (x_3), and the distance from the city of Oulu (x_4). The statistical analyses have been done in the same way as in analysing the extent of ley plants, and they comprise of correlation, partial correlation, and multiple regression analyses (Table 5).

According to the correlation analyses (Table 5) the strongest dependence between the real relative number of cattle (y) and the other variables (x) is the one between y and x_1 's (= the indicators of the arable size of the farms). The correlations between y and x_2 (= the number of farms, indicating local natural preconditions of farming), and between y and x_4 (= the distance from Oulu) also are relatively strong, being, however, about half of the strength of the first correlation above (y/x_1). Between y and x_3 (= the frostiness) there exists no correlation worth mentioning. We see, further, that the standardized relative number of cattle (x_1 in Analysis b) has a stronger correlation with y than does the mean arable size of the farms (x_1 in Analysis a). This means that the former indicates better the influence of the arable size of the farms upon the phenomenon in question than the latter. According to the results of these correlations one can say that the real relative number of cattle is the greater the smaller the arable

Table 5. Statistical analyses concerning the relative number of cattle.

VARIABLES

y = mean real relative number of cattle
 x_1 = mean arable size of farms (Analysis a)
 x_1 = standardized relative number of cattle (Analysis b)
 x_2 = number of farms
 x_3 = frequency of farms experienced frost damage in 1959
 x_4 = distance from the city of Oulu

PARTIAL CORRELATION COEFFICIENTS

	x_1	x_2	x_3	x_4
a	-0.73	0.03	-0.42	0.65
b	0.84	0.21	-0.33	0.56

CORRELATION COEFFICIENTS

	x_1	x_2	x_3	x_4	y
x_1 a	1.00				
x_1 b	1.00				
x_2 a	0.43	1.00			
x_2 b	-0.54				
x_3 a	0.16	-0.30	1.00		
x_3 b	-0.08				
x_4 a	-0.01	-0.43	0.59	1.00	
x_4 b	0.23				
y a	-0.71				
y b	0.86	-0.43	-0.07	0.41	1.00

MULTIPLE REGRESSION ANALYSES WITH TEST VALUES ($F=1.00$ for entering and removing variable, stepwise procedure)

Regression equations

Analysis a	Df	F	S	R	Expl. %	Constant	bx_1	bx_2	bx_3	bx_4
Step I $y = 69.5 - 2.80x_1$	35	35.0	10.8	0.70	48.6	4.37	.001	.005	.001	
Step II $y = 53.6 - 2.78x_1 + 2.92x_4$	34	15.5	9.06	0.80	63.7	4.83	.001	0.04	.001	
Step III $y = 50.6 - 2.57x_1 + 4.32x_4 - 2.67x_3$	33	7.51	8.30	0.83	69.5	4.55	.001	0.04	.001	0.07 .001

Analysis b

Step I $y = -43.0 + 2.21x_1$	35	10.2	7.71	0.86	73.7	8.54	.001	0.02	.001	
Step II $y = -44.6 + 2.08x_1 + 1.59x_4$	34	7.08	7.11	0.88	77.6	7.91	.001	0.02	.001	0.06 .02
Step III $y = -40.7 + 1.95x_1 + 2.65x_4 - 1.87x_3$	33	5.36	6.70	0.90	80.2	7.64	.001	0.02	.001	0.08 .05 0.07 .001
Step IV $y = -49.3 + 2.10x_1 + 2.80x_4 - 1.63x_3 + 0.15x_2$	32	1.47	6.65	0.90	80.4	10.43	.001	0.02	.001	0.08 .10 0.07 .001

Df = degrees of freedom; F = F-number (or ratio); S = Standard deviation of residual terms; R = multiple correlation coefficient; Expl. % = explained part of the total variation of y ($= 100 \times R^2$); b_{xj} —4 = partial regression coefficients.

size of the farms is, and the more unfavourable the natural preconditions of farming are, and the greater the distance from Oulu is in the study area.

The partial correlation analysis has been made here also in order to remove the effect of the correlations existing between the independent variables. The results of this analysis show that the correlations between y and x_1 are here as strong as in the correlation analyses above (Table 5). The partial correlation between y and x_2 (= the number of farms) is, however, markedly weaker compared with the result of the ordinary correlation analysis. Instead the partial correlations between y and x_3 , and especially between y and x_4 are clearly stronger than in the ordinary correlation analysis. These results seem to suggest that the arable size of the farms dominates as a factor causing the areal differences in the relative number of cattle. The local natural preconditions of farming (x_2) do not have as strong an influence upon the phenomenon in question as the ordinary correlation analysis would suggest. The more general natural differences, as is the frostiness, seem to be more influential. The distance from Oulu seems to be a very strong factor, stronger than the ordinary correlation analysis showed.

According to the results of Multiple Regression Analysis a (Table 5) the mean arable size of the farms (x_1) explains most of the total variation of the real relative number of cattle (y). Its contribution is about a half and, compared with the final explanation of the model, about $2/3$. The distance from Oulu (x_4) has entered into the model at the second step, and it has markedly increased the explanation of the model. The frostiness (x_3) entering into the model at third step has, however, increased the explanation only a little. These results show that the arable size of the farms is the most important factor, and the distance from Oulu has the second position in causing the areal differences of the relative number of cattle. The natural factors have relatively little to do with the phenomenon in question. This result can be expected according to the results of the partial correlation analysis.

In Analysis b the standardized relative number was used to indicate the influence of the arable size of the farms. According to the results of this analysis (Table 5) Variable x_1 explains really the most of the total variation of the real relative number of cattle. Its contribution is about ninety per cent of the final explanation of the model.

The distance from Oulu (x_4) increases at the second step markedly the total explanation of the model. Other variables, x_2 and x_3 , which indicate the natural preconditions of farming have not increased the total explanation of the model worth mentioning.

According to the results of the multiple regression analyses above (a and b) the arable size of the farms (x_1) has proved to be the best variable to explain the total variation of the real relative number of cattle. The standardized relative number of cattle (x_1 in Analysis b) does this, moreover, better than the mean arable size of the farms (x_1 in Analysis a). At the second step in both analyses the distance from Oulu (x_4) has markedly increased the explanation of the models. The natural preconditions of farming (x_2 and x_3) explain only a little the phenomenon in question, according to the results of the analyses.

The statistical significance of the results obtained from the multiple regression analyses can be stated from the fact that the models in both analyses are significant at the risk of 1 % to the third step, according to F-test. The fourth step, however, in Analysis b is not more significant. The partial regression coefficients are also very significant to the second step. The coefficients of the third and fourth variable entering into the models are only weakly or not at all significant. This shows also that these variables, x_2 and x_3 , are not able to explain the phenomenon in question. The residual terms have a normal distribution, too. In their areal distribution there are no marked differences between Analyse a and Analyse b. The positive deviations are most numerous in the central part of the study area, and the negative ones mainly in the western part of the study area and in Oulujoki area respectively (Fig. 11).

According to all the results above concerning the factors influencing upon the relative number of cattle it is evident that the arable size of the farms and the distance from Oulu have strongest contribution to the phenomenon in question. The both factors have, concerning their way of influence, the same primary cause: the internal and external labour markets of the farms. The small farms have relatively plenty of domestic labour but the large ones feel the scarcity of it. Therefore the relative number of cattle which line of production needs relatively plenty of labour is great on the small farms and small on the large ones (Hult 1966, pp. 80, 121—3). The explanation concerning the way of influence of the distance from Oulu has been discussed above. There is, near the city, scarcity of labour and the

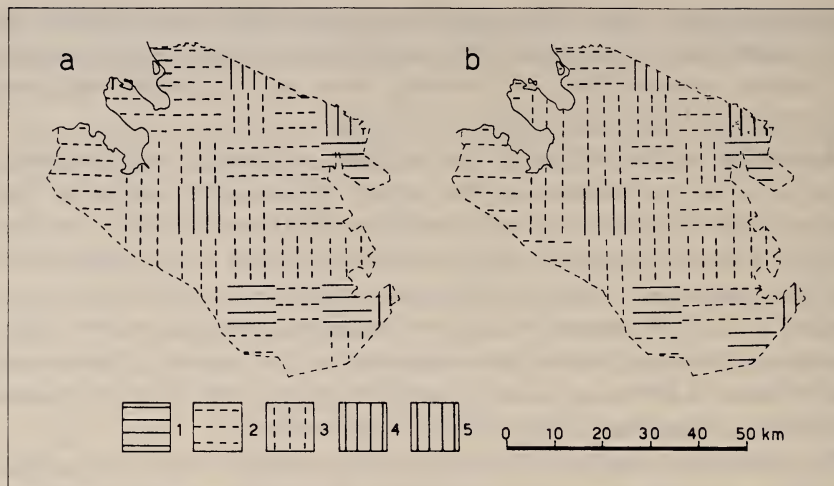


Fig. 11. Cattle: distribution of residual terms, a = according to the results of Multiple Regression Analysis a, b = according to the results of Multiple Regression Analysis b, 1) -2 — -1 , 2) -1 — 0 , 3) 0 — 1 , 4) 1 — 2 , 5) 2 — 3 standard deviations of resp. residual terms (cf. Table 5).

relative number of cattle is, therefore, low. In the marginal, peripheral areas there is plenty of labour, and the relative number of cattle is there bigger than the average. The natural factors have only tiny influence upon the phenomenon. It is, however, characteristic that the frostiness affects in this connection more than the local, mainly the soil factors indicated by the number of farms. It is very easy to understand that the frostiness, being a general factor, affects the relation between the arable farming and the animal husbandry, and in this way the relative number of cattle. The soil factors cause very local differences in natural preconditions of farming, and their influence concentrates in the arable farming. So they have only a little to do with animal husbandry there.

THE INFLUENCE OF THE AREAL VARIATION OF THE ARABLE SIZE OF THE FARMS UPON THE AREAL DIFFERENTIATION OF FARMING

On the pages above it has been explained the influence of the areal variation of the arable size of the farms upon the areal differentiation of farming. This has been carried out by the help of the

arable extent of ley plants and the relative number of cattle. In this connection the influence of other factors such as the soil, the frostiness and the distance from the areal nucleus, the city of Oulu, upon the phenomena in question have also been explained.

The visual analyses showed that the arable size of the farms affects the areal differentiation in farming. In the statistical analyses this factor proved to be the most important one to explain especially the areal variation of the relative number of cattle, and the relative extent of the ley plants in the arable area as well. The second factors explaining the latter were local, mainly soil factors (indicated by the help of the number of farms), and in the sphere of cattle farming the distance from Oulu. This shows that the local factors have importance in the arable farming. Concerning the animal husbandry the labour supply and use are critical in respect to both the influence of the farms' arable size and that of the distance from Oulu as well. The influence of these factors is thus both direct and indirect upon the phenomena in question.

Concerning the use of the methods it can be stated that among the statistical methods the results of partial correlation analyses accord mostly very well with those of the multiple regression analyses. The results of the ordinary correlation analyses are not enough because of the internal correlations which exist between the independent variables. Further, by the help of the results of the multiple regression analyses the importance of the factors can be stated. According to the synthetical nature of this method the total model consisting of several factors can be made. Both of these views are important in geography. It can, further, be stated that the used, the so called standardized values, have proved to be of good usability in analysing the classified properties of the phenomena of this kind.

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FINLAND: A DEVELOPED AND AN UNDEVELOPED COUNTRY ¹

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In today's political and economic discussion the words "developed" and "underdeveloped" (or "undeveloped") are often used. The expressions developed, underdeveloped or undeveloped are in themselves not very good and because of this everyday use the meaning of these words tends to be rather vague. It is therefore not very easy to answer the question 'Is Finland a developed country?' First I will discuss Finland's general place among the nations of the world judged by their economic level, and then the regional variations of the economic level inside Finland itself.

The most commonly used indicator for dividing nations into developed and undeveloped countries is the national *per capita* income. For several reasons this indicator is by no means a straightforward one.

Demographic structure varies from country to country. Most of the undeveloped nations have many more young people than the developed nations. This means, among other things, that the ratio of labour force to total population varies considerably. Another limiting factor is that the primary statistical material is of poor quality in many countries. The national income or national product as the UN Statistical Yearbook tells us, is measured differently in different countries. Even in the United States, with its well established

¹ This paper was originally a lecture held at King's College, London University, in December 1965. It is printed with some changes in this volume of *Acta Geographica* dedicated to the memory of my friend and colleague, Professor *Helmer Smeds*, who wrote such excellent papers on the geography of Finland.

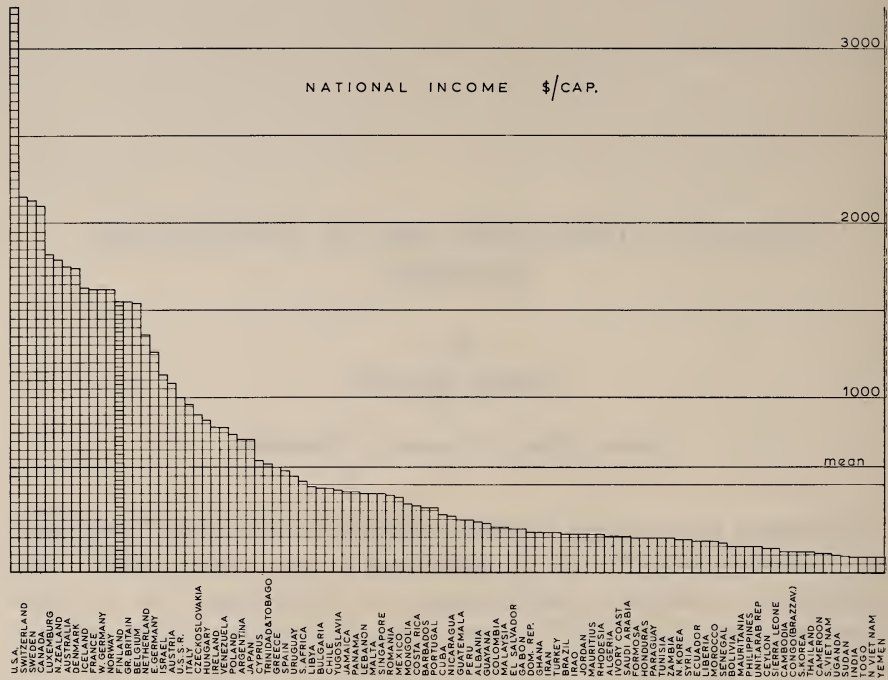


Fig. 1. National income in dollars *per capita* in 100 countries in 1965 (Excl. Kuwait); the global mean *per capita* income is here marked as well as Finland's position.

statistical research work, the national income figure may have an error coefficient of up to 5 %. In this connection we can note that the technical assistants required from UN agencies by undeveloped countries are very often statisticians.

The greatest difficulty with such indicators as the *per capita* national income is, however, to translate with an illusion of reality the different monetary units into a standard unit (usually dollars). The varying annual inflation trend is difficult to take properly into account. The impact of devaluation, for instance, is of the utmost importance; devaluation also never seems to take place on dates most suitable for the purpose of statistical comparisons.

Therefore, the order in which the nations occur in this presentation (Fig. 1) of data from a table compiled by the International Monetary Fund in 1965 is not correct in its details. The diagram suggests a degree of precision which is simply not there. The general

impression of the diagram, however, makes enough sense to enable us to use it as a tool to point out some differences between the economic standing of the countries concerned. National income, regardless of which method we use, does anyhow include the total amount of all the products and services which are consumed by the private citizen or by the government. The *per capita* income figure is, thus, primarily a rough measure of the general economic activity of the country. To a lesser degree it seems to be an indicator of the living standard of the people itself; this side of the problem is not dealt with here.

In recent comparisons of the economic level of various countries the *per capita* national income is often combined with other indicators, as Fryer, for instance, did in 1958. He combined the *per capita* national income figures with three other indicators illustrating the demographic pattern, structure of the working population and degree of urbanization. Fryer seems to think, very conventionally, that a high percentage of agricultural population always correlates with a low level of development. Thus, Finland, in this system, is placed among the "semi-developed" countries. Fryer's analysis reflects the general economic thinking of the 1950's, i.e. that rapid industrialization is in all cases and in every region the only way to reach a higher stage of economic development. In his analysis, Fryer places the Eastern Bloc countries in a separate group. However, since Fryer wrote his paper, which was based on material from about 1950, statistics from the Soviet Union and other countries with planned economies have flowed in more rapidly. Inside this group too we find, of course, countries in very different stages of development, see Fig. 1.

In his well known "Atlas of Economic Development" (1957) Ginsburg used 43 both technological and demographical indicators to create a mathematically more elaborate picture of the global economic development pattern. Due to the low level of reliability of the national statistics our attempts to compare different countries, of which each is a geographical "species" of its own, often results in a translation of well known facts and generalizations into a complicated terminology and seemingly misplaced mathematics. Or as Mark Twain put it much better: "The researches of many commentators have already thrown much darkness on this subject and it is probable that, if they continue, we shall soon know nothing at all about it."

According to both Freyer and Ginsburg, Finland is not very highly placed on such lists attempted to show the economic level of the different countries, and Finland is generally placed far below the other so-called Nordic countries. One can doubt the validity of such judgements (or rather the validity of the criteria used). However, I'm biased, of course.

Here it seems reasonable to draw a few comparisons between two northern neighbours, Finland and Sweden. The Finnish standard of living is more or less the same as that of Denmark, Norway and Sweden. This is true of more than the mere superficial affluence apparent in the streets, market places, show-windows and houses. Before the 'Affluent Society' can develop into a true 'Welfare State', however, governments must be deeply concerned with the idea of social security. In this respect, the United States does not have the clear-cut lead one might imagine from looking at the annual *per capita* income statistics. Social security legislation is a matter of vital importance. Old-age pensions, children's allowances and health insurance are in a developed country clearly prescribed by law. Today Finland meets these requirements reasonably well, even measured by severe Scandinavian standards. At the present time, about 18 % of Government expenditure in Finland is earmarked for social security and health service measures. About 15 % of Government expenditure is allocated to education and research. In this respect, however, Finland lays behind some other countries.

It is natural for Finland to compare the level of her economy with that of Sweden. If we limit this comparison, as above, to the material indices of everyday life, then the present picture is a fairly favourable one. But if we take a look at the size of each country's National Product and their output *potential* in particular, a different image emerges. Even if Finland's production continues to grow in the future at the same pace as in recent years, our economy will not reach the present Swedish level for another ten or fifteen years.

Everyday life in Finland seems still to be more "friction-free" than in many other countries. The well-documented rise in the Finnish standard of living after the war can be interpreted in some degree as the expression of a strong desire to 'live for the moment' and let tomorrow take care of itself. This, no doubt, is a hangover from the war years. Is it possible that a certain feeling of insecurity in face of

the future is forcefully driving Finland, a border country, to live beyond her means and beyond the limits indicated by her actual resources?

Finland's wage and salary level is today in general lower than Sweden's. Although the size of the pay-package increased rapidly after the war, the 'real wages' have not risen to the same extent. This helps to explain the current drain (until recent recession years) of manpower from Finland to Sweden. The existence of this costly Skills and Brain Drain illustrates better than words the difference in present income levels between Finland and Sweden.

Post-war developments in Finland closely resembled those in other European nations on the losing side. It was a case of paying huge reparations, reconstructing those parts of the country that had been worst affected by war, and resettling nearly half a million Karelians in new homes. All that was long ago. Perhaps we should by now have ceased to bemoan such facts. But the truth is that the effects of this gigantic shake-up more than twenty years ago are still felt both in the country's economy as a whole and particularly in its agricultural policy. Here problems remain to be solved.

In Finland, until very recently, we have been wresting land from the forest at the rate of anything from 20,000 to 40,000 acres a year (compare, particularly, Smeds 1960 b and 1962), whereas in Sweden roughly 50,000 acres of land is annually being transformed into potential forest! However, this does not necessarily mean that the until recently continued forest-clearance in Finland is a sign of economic underdevelopment. By and large, we should perhaps guard us against too great a world-wide conformity in economic structures, if we wish to offer coming generations the variety and opportunity of choice which is thought by so many to be the spice of life.

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Let us return to our subject: What is a developed and what is an undeveloped country? This subject cannot yet be discussed as a scientific problem, since the premises for it, as I have tried to point out earlier, do not exist yet. So I'll only venture a few comments.

In 1964 the well known expert on undeveloped countries, Dr R. Prebisch, wrote a lengthy report for the first UN Trade Conference in Geneva. The conference mainly dealt with the necessity of a preference system to benefit the stagnating trade of the undeveloped countries. He wrote that "no single criterion has been found satisfactory in identifying those countries which should be regarded as

qualifying for preferential treatment", i.e. the underdeveloped countries. He does not discuss the matter at any length, but mentions as suitable indicators a) the *per capita* national income, b) the size of the country, c) the structure of its labour force and production, and, as an additional indicator, d) the role of the primary export in the total economy of the country. But, "there will always be a small group of border-line cases at the top of the *per capita* income range and it is not an easy matter to establish the cut-off point among them". Prebisch never tells us which countries he has in mind when he points out how difficult it is to draw the cut-off point. It is not easy to establish a "divide" between developed and undeveloped countries or to place on a map the "hunger border" or whatever we will call the most important border-line in the world.

Where do we draw a line in Fig. 1 between developed and undeveloped countries or between rich and poor countries? Or look at diagrams showing the number of cars, the consumption of newsprint or the foreign trade index *per capita* (cf. Ginsburg l.c. and Alexandersson 1961). Compare also the 'export coefficient' of Thoman and Conkling (1967 p. 78), i.e. $\frac{\text{export}}{\text{G.N.P.}} \times 100$; according to this formula Finland's position is just at the "mean", i.e. 22. We could use tens of such different indicators. In all of them we find the same difficulty of establishing a cut-off point between developed and undeveloped countries.

It is not the size and structure of the population in general and the natural resources of a country alone which are vital for economic development. The standard of knowledge and the general technological level of a country and its all-round *potential*, including size and geopolitical situation, must also be considered. But to measure these indicators correctly is not easy.

In passing, the poor correlation between the birth-rate and economic development is here demonstrated by a diagram (Fig. 2). Contrary to a rather general belief, particularly before the second world war, the correlation between economic level and birth-rate is very slight. In this connection some of you will remember the axiomatic theses of the 1930's that the population of western Europe was stagnating. Today the picture is much more complex as, for instance, investigations of different income classes in the USA show.

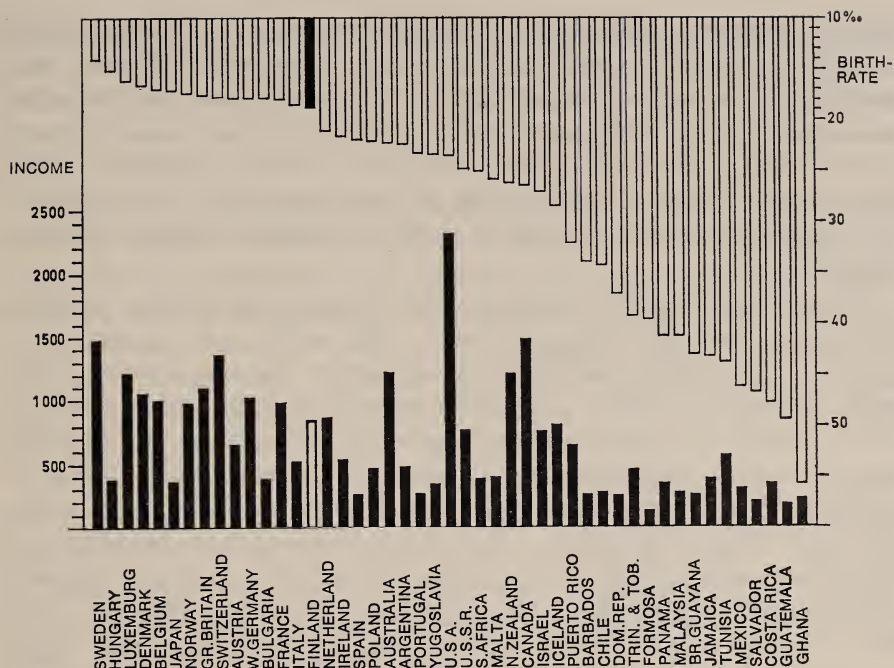


Fig. 2. Comparison (1960) between birth-rate and income level for 47 countries.

Small nations like Finland try awkwardly to convince themselves that the "quality" (i.e. in this connection higher educational level, old traditions as a developed nation, etc.) of a people still means more than "quantity". In the automated and push-button world of today, I'am not so certain if this belief is correct. We know from many investigations that so far there is a correlation between 'know-how' (in whatever way it might be measured, number of students, etc.) and economic development. However, this indicator should be expressed less superficially than usual is done.

Nobody has yet been able to draw an exact line between a developed and an undeveloped country. No one will be able to do so in a near future. Both categories are also very heterogeneous. The group of rich and highly developed industrialized countries contains both big and rich nations with a sparse population, as well as small and rich nations with a dense population. In the same group we have to include countries with a temporary and superficial richness because of oil exploitation, and countries which to a high degree rely on a

highly developed agriculture. And in the group of undeveloped countries we have a similar spectrum of differences, different geography, population, size, climate etc. in a varying pattern, but with the same monotonous result, poverty. In addition to all this, we must consider that inside each country we have a vertical income structure of varying kinds; the varying size of the amplitude in this national income structure could in itself be used as a suitable indicator of development.

The economic activity of man is thus a complicated thing, which is not easy to boil down into a formula. The activity of a society or a nation is a still more complicated phenomenon. No one country is the same as another. This is a simple geographical truth, which seems to be too simple for us to swallow when we try to make our pedantic global economic analyses using as material a heterogeneous series of countries, from Luxemburg, Malta and Kuwait to the United States, the Soviet Union and China. And for this comparison we often use too subtle mathematical devices, before the primary statistical material itself is really comparable. One wellknown economist (Myrdal) once put it this way (see William-Olsson 1968, p. 62): "Economists have never mastered the art of incorporating the relevant geographical set-up into their models and time-charts." — However to systematize is, nevertheless, already to know a little.

Finland can be placed among the developed countries within the rather primitive framework provided by national *per capita* income statistics. But among the developed countries Finland is clearly at the bottom of the scale, because, for instance, of its narrowly based export industry; the wood, pulp and paper industry in Finland still accounts for about 65 % of our exports.

Finland's development from an agricultural country to an industrial country has, nevertheless, been rather fast, due to high and continuous demand untill recently for our major export products. Our most urgent task now is, nevertheless, to diversify our exports, which, of course, is more easily said than done, in a time of increased competition wherever you go. However, we cannot call our heavy dependence on wood industries an "undeveloped" feature and compare it with an economic "monoculture" of the same kind as the cocoa production of Ghana or the rubber production of Malaysia. With wood as the raw-material, a very diversified production has arisen in Finland in recent decades, from more or less simple standard products to a wide range of

paper and complicated wood-chemical and packaging products, etc. We have created within this huge industrial sector a clear trend from technically less refined to highly refined products. In recent years the Finnish metal industry has, however, grown into a considerable export industry.

Another so-called undeveloped feature of our economy is, according to some experts (compare Linnamo 1964), the large percentage of "unproductive investments", i.e. investments in infrastructure, i.e. roads, railways, government buildings, etc. However, I don't think the term "unproductive" here is strictly correct, as high *per capita* transportation costs are a feature that is directly correlated with geography; it marks every sparsely populated country, regardless of its size and economic level — compare Canada and Australia, for instance.

At many international trade conferences, Finland has been included in the so-called developed world. Finland, however, unlike Sweden, does not belong to the financially important "Group of Ten". For this and other reasons, Finland should perhaps be placed into the "border line" class mentioned above, just inside the entrance to the club of highly developed industrialized countries.

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But every country, regardless of how highly developed it is, has poor people living far below the average level of the statistical mean figures. According to recent estimates, there are 35—50 million very poor people (including whites) in the USA.

Every developed country also has its own undeveloped regions, which must be labelled underdeveloped, compared with the developed core-area of the country in question. This is due to a series of simple but important and varying geographical conditions, such as distance, topography, history, racial structure (as in South Africa), etc.

Since the second world war lively discussion about the undeveloped countries has focused our attention on the undeveloped regions *inside* the developed countries themselves, i.e. the regions which in England are called "developments areas"; in America "depressed areas". In every country there are areas which stagnate and from which the population moves towards the centres of economic activity.

The expression "underdeveloped" or "undeveloped" region is here understood only as a region which is under- or undeveloped compared with other regions in the *same* country.

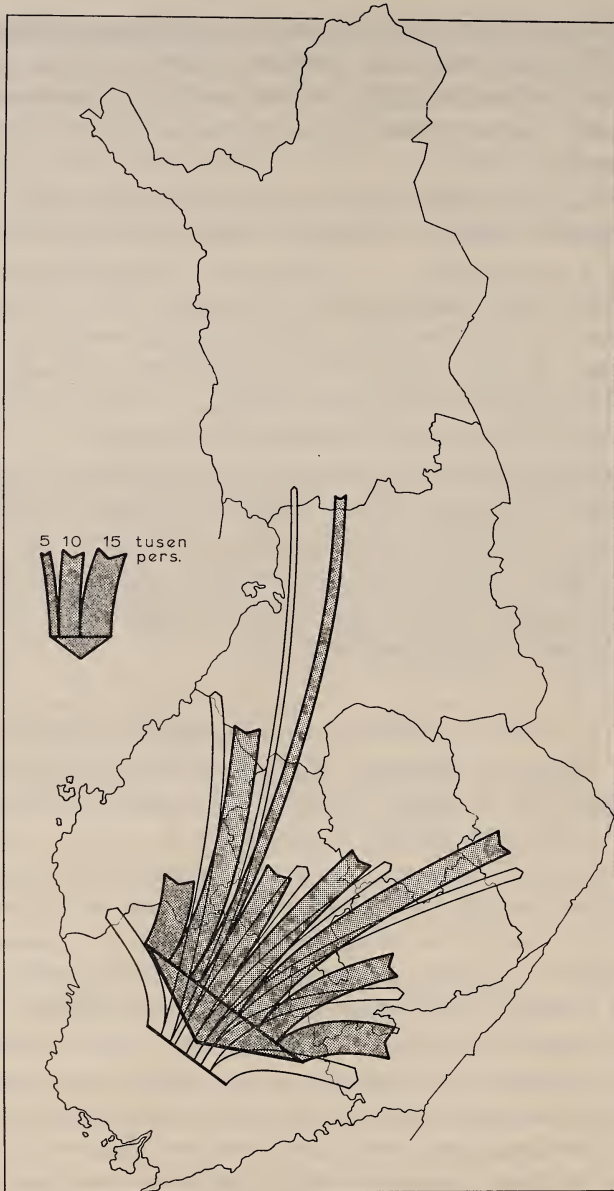


Fig. 3. Simplified presentation of the internal migration in Finland 1963—65 according to the Stat. Yearbook of Finland 1964—66. The migration from the central and northern provinces into the southwestern Finland is marked with dark arrows; white arrows show the migration from southwestern Finland towards north and east. The southern trend is clear and has been the same in the last decades. (The width of the arrows refers to 5,000, 10,000 etc. persons.)

In Finland, too, since the second world war there has been intense discussion about the need to decentralize industries and economic activity in general. However, until recently this discussion has been more or less fruitless i.e. academic. Migration towards southern Finland has increased to such an extent that a real problem has been created. Migration is flowing towards the historic core-area of Finland; migration of a similar nature can be observed in practically every country. It is bound to happen to some extent in any case, but clearly it is accelerated by economic stagnation in certain areas and by the increased mobility provided by modern means of transportation. Fig. 3 illustrates the general direction of migration in Finland.

Finland still has a long way to go before the percentage of the population employed in agriculture (now about 25 %) reaches the same low figure as, for instance, in Sweden, where it is about 12 %. This means that there is still a potential migrant population from agriculture to industry and service in Finland of about 10,000—15,000 per year.

The undeveloped areas (i.e. areas with a lower income level per capita than the average level of the country, for all sorts of reason) are of two main types (see Hustich 1964):

- a) primary undeveloped regions and
- b) secondary undeveloped regions.

In *primary undeveloped regions* economic activity in general has never been greater than today. The birth-rate is still higher than the out-flow of migrants. Such areas are undeveloped only because they are not yet sufficiently included in the network of the economic life of the country in question. Such regions are in general marginal forested areas or mountainous and lake regions, i.e. sparsely inhabited areas. A better name for such a primary undeveloped area is an "economic reserve region", a hitherto unused area, awaiting development, i.e. a process resulting in a higher *per capita* income level.

Fortunately, Finland still has large sparsely inhabited areas inside its own boundaries, areas which provide a potential, i.e. space and raw materials for the future. In such primary undeveloped regions on the northern and eastern periphery of Finland, every new road, new school or small factory in fact brought, until recently, new opportunities for the people. The whole mental approach is still rather optimistic. A change, however, has been apparent during the latest years, and a depopulation tendency is already visible in north-eastern Karelia and

in the eastern districts of Lapland. Most of the big hydro-electric projects are ready and the large-scale road building is completed. We can not develop a better and larger infrastructure for a population which seems to begin to decline if we neglect to fill up the infrastructure with new employment opportunities.

The *secondary undeveloped areas* are in a still worse position. In such depressed areas — they are found in every country — human activity is more clearly decreasing. The young people move out, as they have no chance to earn a living in their own region, partly because old-fashioned factories are forced to close and partly because of the rapid change in the structure of agriculture due to mechanisation (see, for instance, Smeds and Mattila 1941) or because of changes in fishing methods, as in the archipelago along the coast of Finland (compare Jaatinen 1960 and Hustich 1964). When people start moving out of an area, the most active young people usually move first. The whole life of the region changes and the mental approach of people in such areas begins to be more and more pessimistic. The expression »depressed area» which is sometimes used for such regions is clear enough in its meaning. We have many small »vicious circles» in the secondary undeveloped areas; their disastrous effects on the mentality and therefore on the activities of the local population are well known.

Particularly in the last few years, Finnish government agencies have tried, at least in theory, to diversify economic activity regionally and to develop the stagnating areas in order to reduce the one-way movement of migrants. It is, however, a very difficult task. The greatest danger arises when we start to believe that the more common a phenomenon such as the depopulation of certain regions is, the more "normal" and "correct" is it. As soon a phenomenon is labelled "normal" it means that people think it must be comparable to a natural law, which we should not stand up against. But we often forget the fact that we are dealing with human beings. Man is no simple "production factor", man is neither an engine nor a certain quantity of money that can be moved and used regardless of emotions involved. Modern planning seems often to forget this aspect or to think about it as merely a frivolous point of view.

Much has been done in Britain, France, Poland, Germany, Norway and in other countries to develop undeveloped areas (see the detailed reports recently published by OECD and EFTA on policies to aid

depressed areas). In particular an important report by a Swedish commission on "Active Location Policy" (1964) must be mentioned as it contains, among other things, good work on modern economic geography.

For long, economists in Finland seemed to belong to a more old-fashioned school than their colleagues in many other countries in their negative approach to state or government action to solve the problems of the undeveloped regions. To aid depressed areas with loans, credits and industrial subsidies is a more generally accepted tool in western Europe than in Finland. Recently this attitude had for a while changed in Finland; the problem of the undeveloped regions provoked both discussions and some action also. But in the last years a certain negative tendency is again apparent.

The greatest difficulty was, of course, to find an impartial way of delimiting the undeveloped areas. The work in a government commission of 1963 (and in another committee of the same kind which was established in 1967) opened my eyes to the fact that very little geographical research had so far been done on the regionally varying economic level of Finland (an attempt was made by Hustich—Wahlbeck in 1952). One would think that such a question would be an easy object for geographical studies in a comparatively small country. On the contrary, it has proved to be a very difficult and delicate job. However, a great effort has been made by us recently to improve our geographical knowledge of such problems. The discussions and the Finnish Commission Report on Undeveloped Areas of 1965 prompted, among other things, a comprehensive study of our centres and their influence areas (Palomäki *et al.* 1967).

In a research report of our State Planning Office (Palmgren 1964) a simplified Ginsburg-method was used to evaluate the regional differences of economic level in Finland. Palmgren arranged our about 540 counties in groups of ten, taking separately income level (see, however, Fig. 4), degree of urbanization, percentage of people working in industry, service or agriculture, number of cars, the percentage of households with electricity and running water, etc. He used two series, one with ten and one with eighteen indicators. Palmgren then estimated the level (grades 1—10) of the different local authority areas (counties, "communes") according to their range of development as per the various indicators. His simple method was thoroughly discussed at a symposium

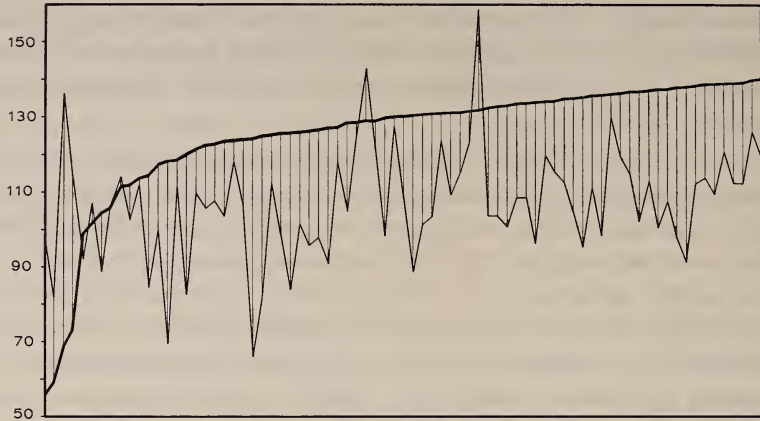


Fig. 4. A comparison between two *per capita* income series relating to small regions in Finland. The thick line shows *per capita* income (based on the tax returns) in Finland's 75 poorest counties or communes in 1960. The thin line shows the *per capita* income in the same 75 counties in 1955. Latter series was used by Palmgren 1964 and Riihinen 1965. Notice the poor correlation between the series. Generally speaking, one can say that the weaker and smaller the counties, the greater the variations from year to year. The same is true when we operate with states instead of with "communes".

in 1965 arranged by the Geographical Society of Finland. Even if the geographers in general found the method a little too simple, Palmgren's paper, nevertheless, gives a clear idea of how disparate Finland is regionally in regard to its economic development because of primary historical and geographical reasons.

The above mentioned Finnish commission's plan of 1965 was in general accepted by the Government. With some changes, particularly regarding the delimiting of undeveloped areas, an Undeveloped Area Development Bill was enacted by Parliament in 1966.

According to Palmgren (l.c.) the undeveloped parts of Finland, i.e. areas much below the average level of development (see Fig. 5), embrace about 1/4 of the population and roughly about 2/3 of the area of the country; the final Bill delimits our undeveloped regions in about the same way, compare Fig. 6.

In Finland, too, the proposals for government support in one form or another (although in fact less radical than, for instance, in Britain, Norway, Sweden or France) have so far also aroused some strong



Fig. 5. The underdeveloped areas of Finland in comparison with the rest of the country, based on material from the National Planning Board (Palmgren 1964; somewhat simplified). Black shows an "economic development degree" of from 1 to 2.2 (max. = 10, according to ten indicators, such as income level, degree of industrialisation, etc.). The criss-crossed areas have a development niveau of 2.3—3.0 and areas marked with vertical lines 3.1—3.8. The towns and cities are not noted. Such an analysis, with indicators sometimes from one year only and sometimes reflecting average values of several years, gives, however, a rather fleeting picture of the situation, which may be temporarily affected by large-scale construction work in northern Finland, etc.

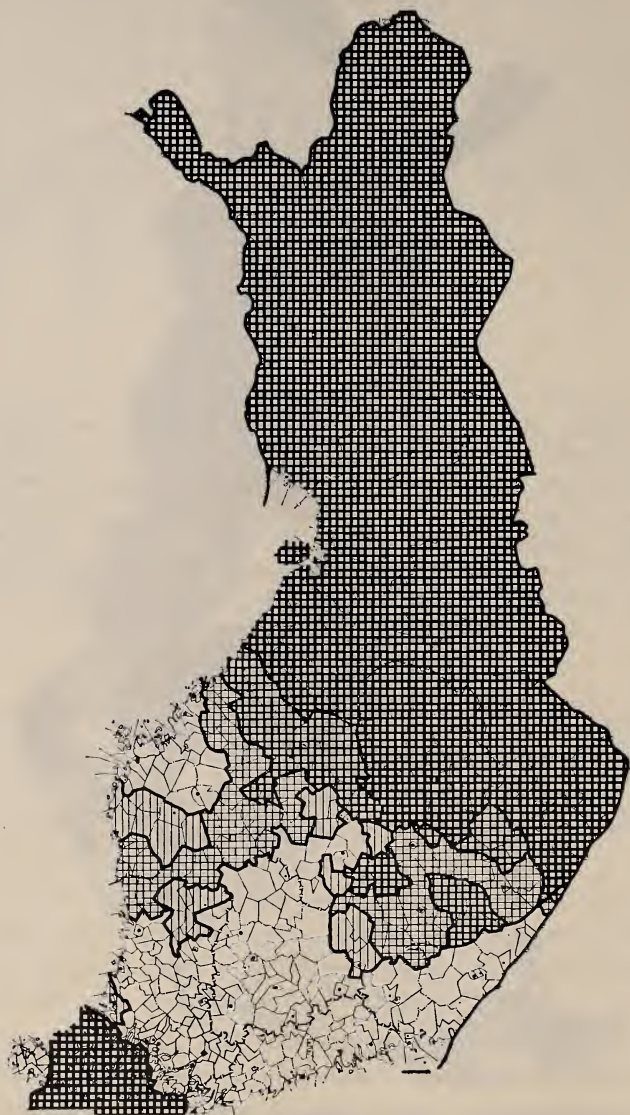


Fig. 6. "Development Areas" in Finland, as finally designated by the Undeveloped Area Development Bill of 1966. Dark shading shows undeveloped areas outlined by the Commission for Undeveloped Areas (1934—65). Light shading indicates the additions made 1965 by the Government before the Development Areas were finally fixed in the law of 1966. A lot of Finland seems to be underdeveloped!

opposition. However, this paper is not the place for the usual controversial discussion about private enterprise contra government aid.¹

I would use the occasion to point out the great challenge to geographers which is offered or indeed forced upon us by such large-scale planning work as now has to be done. There has already been too much discussion in Finland, without enough reliable geographical field-work.

The picture of the distribution of the undeveloped areas in Finland will change considerably because a reform is for the moment going on to form bigger counties or 'blocs of counties'. The necessity of creating bigger and more realistically delineated economic influence areas around central places (with real opportunities to develop) is often stressed today, so often that we almost seem to think that an off-hand formula like "growth centres" will easily solve the whole problem.

Another striking fact emerges from the discussion: Finland has so far a less planned (regional) economy than, for instance, the United Kingdom, France or Sweden.

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I have answered the question "Is Finland a developed or an undeveloped country?" in the title of this paper. Finland is both a developed and an undeveloped country, like most countries nowadays.

We should, however, always remember that a country is not only economic and statistics. *Every country is its own geographic "species"*. We can never expect a similar or an even economic level all over a country; geographical and sociological factors work against it. But we must be able to give all people inside their own country — as long as nations and states exist as entities (one generation or two, three generations ?) — at least a fair chance to earn their living, regardless of where they live in the country. We can never be sure that future planning will follow the same centralization and concentration trend as today. Unfortunately, this issue already has a strong political flavour in Finland.

¹ Recently Arpi (1968, p. 52, here translated from Swedish) wrote some pertinent remarks: "Despite vast quantities of research, we have not yet reached the stage where we can forecast with any degree of accuracy mankind's future needs and resources in a society expanding in the way ours is. Nor, in fact, do we have any great hope within the foreseeable future of producing the fool-proof theories that would enable long-range planning to be freed from its high degree of changiness. All this speaks against any extreme solutions to the liberty-of-choice/efficiency problem in community planning".

It will be one the great tasks in the near future in Finland to balance the percentage of the national income which simply must be devoted to decrease the gap between rich and poor areas.

All this does not mean that we can forget that much bigger and much more urgent problem — the “hunger divide” between the rich and the poor countries. Compared with this global problem ours, fortunately, is a small one.

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THE RANK-SIZE STRUCTURE OF THE AGRICULTURAL HOLDINGS IN FINLAND 1959

by
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This study is intended as a complement to a thorough survey of the population on the agricultural holdings of Finland in the years 1940 and 1959 to be published in the near future. The main purpose is here to show some of the size features of the Finnish land tenure, especially the simultaneous occurrence of the two or three dominating size classes from a regional point of view. The study is based on information from the Agricultural Census of 1959.

The size classes dealt with are shown in Table. 1. The classes 7, 8 and 9 are not numerically of such significance that it had been worthwhile to include them in the detailed analysis. The size class

Table 1. Number of farms in the different size classes 1959.

Size class	Arable area per farm (ha)	Number of farms	Percentage share of all farms
1	1— 1.9	44,943	13.6
2	2— 2.9	36,375	11.1
3	3— 4.9	62,875	19.0
4	5— 9.9	100,429	30.4
5	10—14.9	44,032	13.4
6	15—24.9	25,373	9.0
7	25—49.9	9,997	3.1
8	50—99.9	1,259	0.4
9	100—	202	0.0

Total number of farms	325,467
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1(1—1.9 ha of arable) is included in this study although it is usually not considered to belong to the group of true agricultural holdings (because of its small share of the total arable area and agricultural production). From the point of rural population and settlement distribution this class of holdings however has a considerable importance and is therefore treated in this context.

The size structure of the agricultural holdings of Finland has been included in the statistical surveys since the beginning of this century (1910) and this problem has also been analysed by a number of authors. The question has of course its great social and economic consequences and thus several state committees have worked with it. Helmer Smeds as a geographer has been interested in the historical background and especially in the regional development of the size structure during the post-war period. Thus he has in several articles described the factors affecting the distribution of small holdings in Finland and has also analysed the interconnection between the size of the holdings and land clearance.

The rank size analysis has as its purpose to show some features of the combination of different size classes regionally. Because Finland is mostly a land of small farms only four of the classes obtain a leading or dominating role: the classes 1, 3, 4 and 5. All the other size classes are numerically subsidiary.

The maps (Fig. 1—4) show the different combinations when taking the leading class as the denominator. Besides the denominator class the class in second rank is shown. Moreover there is also included the degree of concentration: for the leading class (if more than 33.3 % of all holdings), for the leading class including the class in second rank (if more than 50 % of all holdings together) and finally for the three leading classes (if together more than 80 % of all holdings). The communes have been used as regional units in this study.

Fig. 1 gives a picture of the communes where size class 1 (1—1.9 ha) is dominating. The geographical situation of these few communes is clearly marginal, northern Finland and the coastal fringe of Finland are the prominent areas. The holdings in this class are hardly real agricultural units, but they still give their inhabitants a significant additional support economically. The inhabitants on these holdings have to combine agricultural support with other pursuits for livelihood. In fact this is true for most of the farms in the size classes 2—4.

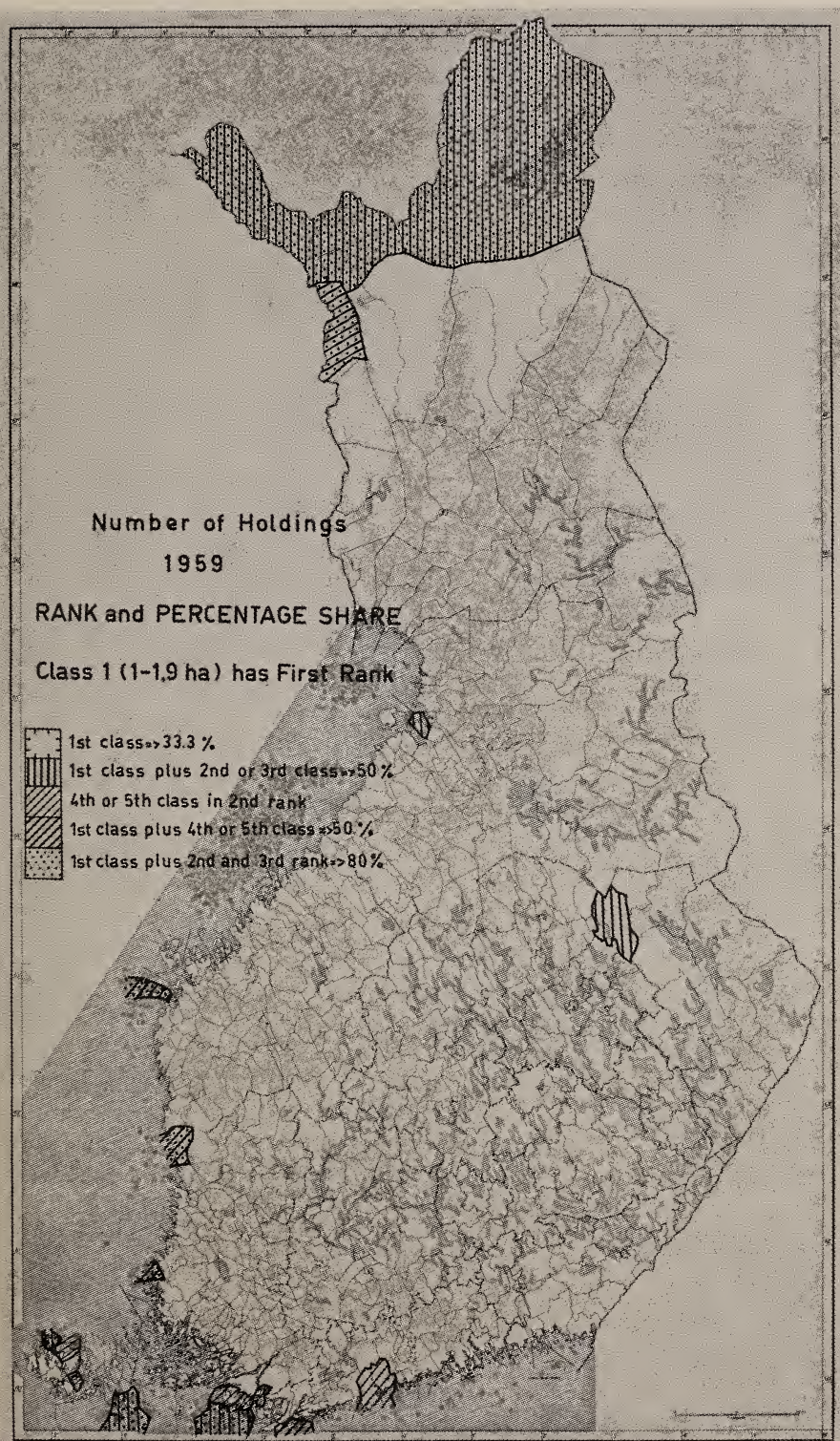


Fig. 1.

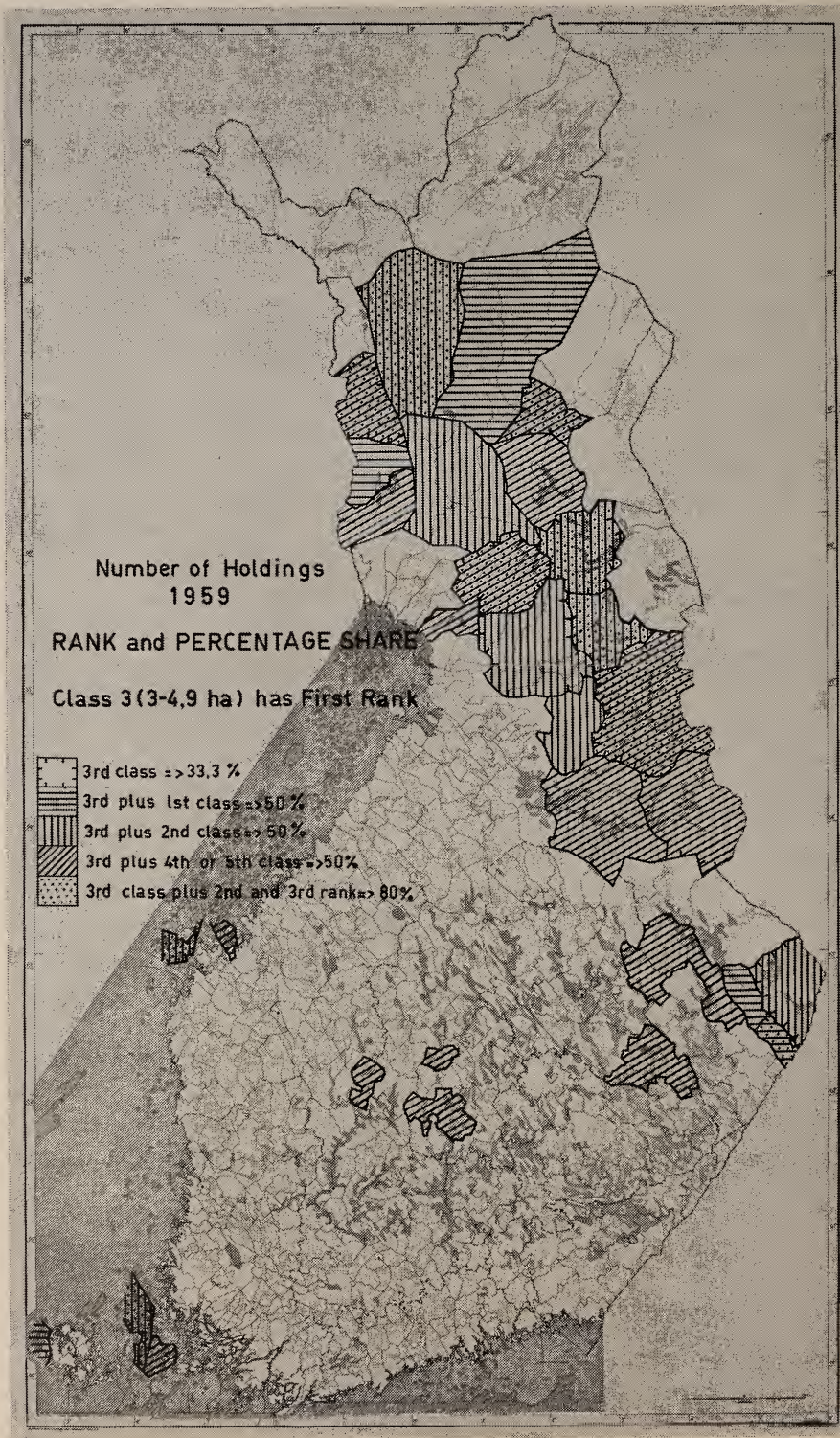


Fig. 2.

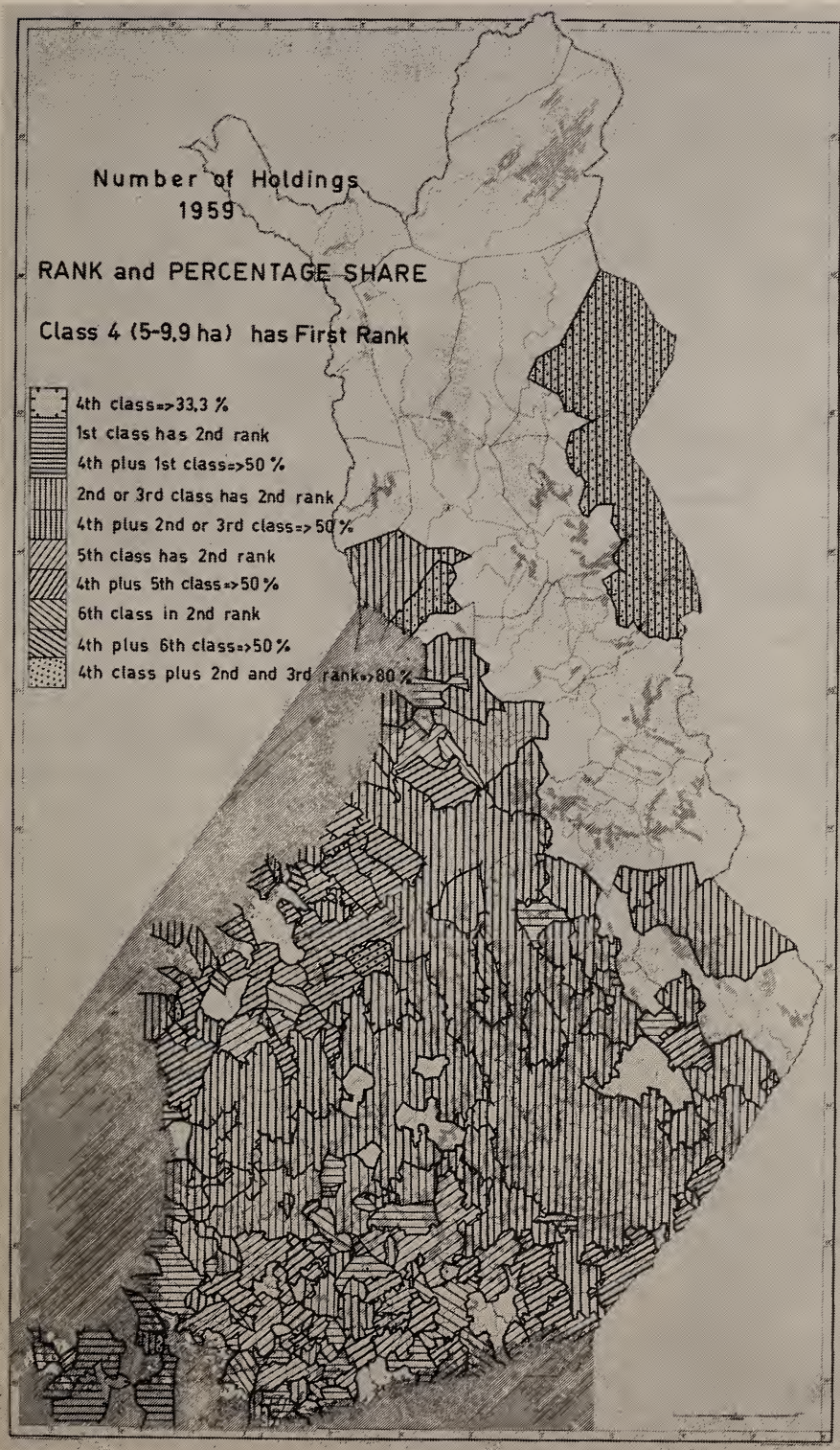


Fig. 3.

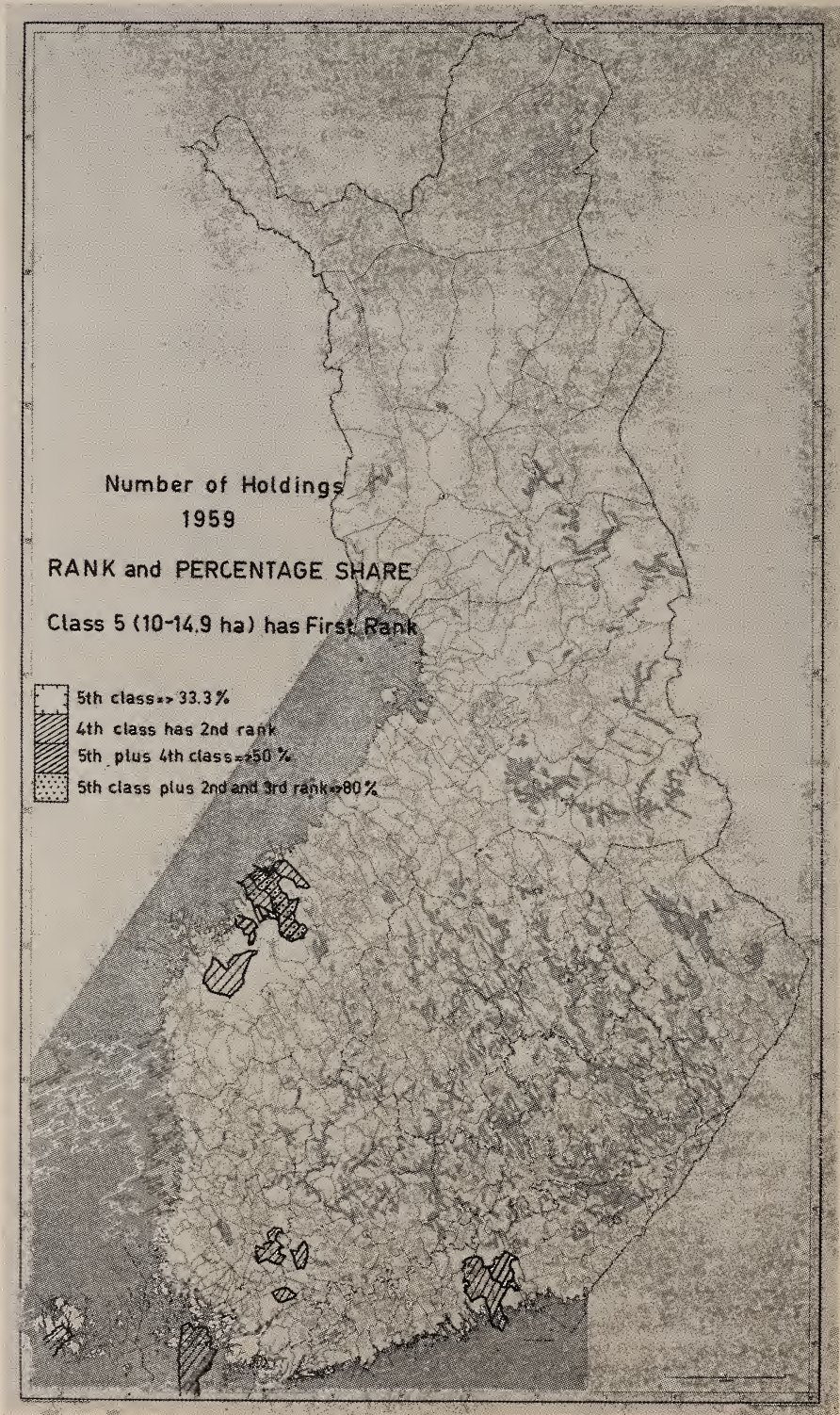


Fig. 4.

As the map shows there are areas where this class has a dominating role of more than 33 % of all holdings of more than 1 ha of arable. Such areas are to be found in northernmost Lapland and in some of the archipelago areas (the communes of Bergö, Kökar and Hitis). The combinations are mostly with the 2d and 3rd classes in second rank as in Lapland and in the archipelago communes Kökar and Hitis, whereas the combination with classes 4 or 5 in second rank are more seldom (the west coast and Åland). It appears that a strong concentration is typical in these cases where the first class is the leading: there are only seven communes where the three classes of the highest rank do not reach 80 % of all holdings.

Class 2 does not have the leading role in any of the communes of Finland and also the regional dominance of class 3 (3—4.9 ha) is rather restricted (Fig. 2). Except a few inland- and coastal communes this class appears as a belt which runs from central Lapland towards eastern Finland (northern Carelia). The combination with the first class is rather rare (northern Lapland, Eckerö on Åland), whereas the 2d class is quite often in second rank. The combinations with the 4th or 5th class in second rank seem to have a rather southerly distribution.

The degree of concentration is such that some 10 communes have more than 33 % of the holdings in this class, only one of them (Brändö on Åland) is outside the main belt of distribution. The 80 % concentration for three classes in highest rank occurs also in 10 communes. On the whole the degree of concentration is quite high in these combinations, which are characteristic for the belt of small farms which runs through northern Finland and which also shows a great coincidence with Granö's frontier zone between "Cultural Finland" and "Natural Finland".

The average size of the Finnish farm (counting the farms with more than 2 ha of arable) is about 8.9 ha. Thus the class 4 (5—9.9 ha) includes this average farm size and is also the most dominant in the whole country (Fig. 3). Its geographical distribution is very clearly south of the belt of the farms of the size class 3, shown on the previous figure. The Kuusamo area is an exception. Along the western and southern coastal fringe there are also some communes dominated by other size classes.

The size class structure is in this case rather complicated, which is quite natural as the number of farms in this class is almost one third of all farms in the country, compare Table 1.

The combination with the 2nd or 3rd class in second rank is most common and especially so in Central Finland and predominately also in the northern parts of the country, including the Kuusamo area. The cases where the 5th class has second rank occur along the western coastal areas and also in southeast and sporadically in the southwest. The combination with class 1 in second rank is southerly in its distribution, in most cases it is a question of archipelago communes. Finally there are a few communes where this group of farms (class 4) has class 6 (15—24.9 ha) in second rank, they are all situated in southern Finland and near the coast.

The concentration of the farms of the main size class (4) is over large areas in Central Finland more than 33 %. This is also the case in the Kuusamo area, where on the other hand the concentration of the farms in the first, second and third rank exceeds 80 %. In the other parts of the country this kind of high concentration in a few classes is hardly seen. On the other hand the 50 % concentration (including first and second rank) is clearly dominant in most of the different combinations included in this group.

The map reveals the dominance of the small farm classes in the size structure, in most cases the combination between the class 4 is with the smaller size groups, whereas the combinations with the bigger size classes are sporadic and confined to the southern parts of the country.

The size structure which is described here is of course only a temporary one, and constantly undergoing changes. Helmer Smeds has clearly pointed out that there has been a balance between forces tending to increase the size of the farms and the average farm structure and other forces which have resulted in smaller farms. The first period of a quick growth of new independent farms occurred at the time of the great partition (Finnish "isojako", Swedish "storskiftet") in the 18th century, when the earlier restrictions on partitions of farmholdings were eased. This period resulted in a decreasing farm size, but it was soon followed by a period of vigorous land clearance which counter-balanced the earlier tendency. The average farm size was again growing. In many parts of the country, especially in the southwestern and southern Finland, the development of new farms was restricted by the formation of crofts on the land of the old farms. In many parts of the country also other categories of landless peasantry grew fast during this period. Finally the social and economic pressure from these groups resulted in a new period of farm creation (the crofter's laws of

1917 to 1923). More than 120,000 new farms were created and again the average size structure of the agricultural holdings was markedly depressed as most of the new farms were small at the beginning. Simultaneously a new wave of vigorous land clearance was stimulated by the new independent farmers and during the last years before the Second World War the average farm size was again increasing.

The third period of development began with the postwar resettlement of the displaced Carelians and war veterans. More than 45,000 new farms were created in a few years' time. At the same time clearance of new arable land also grew counterbalancing partly the partition of old bigger farms and the creation of "cold farms" with a very small arable area to begin with. Since 1950 there has been a clear tendency for the average farm size to increase. This is partly a result of the land clearance, but as this nowadays has almost ceased the main factor is abandonment of small farms and the consolidation of bigger units as a result of the rural depopulation.

So far (according to the statistics of 1959) this trend in the development is still rather weak, but according to a study made by Helmer Smeds (Smeds 1963) it was nevertheless clearly seen. Thus there was in the size class 2—3 ha an absolute decrease in the number of farms between the years 1950 and 1959 of 2,250 units or 6 %. Especially from a regional point of view the tendency towards bigger farm units is clear, thus the farms of the size 2—5 ha show a marked decrease over large areas in Central and Southern Finland, in many instances of more than 10 % (1950—1959). Also the group 5—10 ha shows some decrease in the southern parts of the country. On the other hand there was a distinct increase in this group in Lakeland Finland and in the eastern and northern parts of the country, in some areas more than 40 %. The development in Finland has apparently now turned towards a greater farm size, but the country still is far behind the corresponding situation in Sweden and Denmark.

The last map (Fig. 4) shows the communes where the size class 5 (10—14.9 ha) had a dominant position in 1959. Altogether there were about a dozen communes only. The combinations are mainly with the size class 4. The tendency to concentration is very slight in this group.

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JÜNGERE WANDLUNGEN IN DEN ENSETEANBAUGEBIETEN SÜDÄTHIOPIENS

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Unter den für die Ernährung der Hochlandbewohner Äthiopiens bedeutsamen Kulturpflanzen ist der Ensete (*Ensete ventricosum*) in den letzten Jahrzehnten durch zahlreiche sehr eingehende Untersuchungen, namentlich von geographischer und ethnologischer Seite, besondere Beachtung geschenkt worden. So sind viele bisher kaum bekannte Einzelheiten über Anbau und Verwertung der Pflanze sowie über deren Stellung im Rahmen verschiedener Wirtschaftssysteme und Gesellschaftsformen erforscht und in grössere Zusammenhänge gestellt worden. Auch ein Teil der wissenschaftlichen Arbeit von H. SMEDS in Äthiopien war der Ensete und ihren Produktionsgebieten gewidmet. Seine Untersuchungen, besonders die Studie über Sidamo¹, stellen einen bedeutsamen und vielseitig beachteten Beitrag zur Kulturgeographie des nordostafrikanischen Hochlandes dar. Um so mehr ist es zu beklagen, dass es H. SMEDS nicht mehr gelungen ist, die Ergebnisse seiner letzten grossen Reisen, die ihn vor allem in den immer noch wenig bekannten Südwesten Äthiopiens geführt haben, so wie von ihm beabsichtigt, für eine grössere Veröffentlichung auszuwerten.

Von demjenigen, der mit den Landesverhältnissen nicht sonderlich vertraut ist, wird die Bedeutung, die die Ensetekultur für Äthiopien hat,

¹ H. Smeds (1955). The Ensete Planting Culture of Eastern Sidamo, Ethiopia. *Acta Geographica* 13: 4 1—40; (1961). Ensete- Odlingen i Syd-Etiopien. *Kulturgeografi* 73, 49—59.

fast stets unterschätzt. Man sieht in der Kultur dieser Pflanze häufig eine räumlich doch recht begrenzte Relikterscheinung. Aus einer Durchsicht der wenigen vorhandenen agrarstatistischen Unterlagen und auch aus der Lektüre von Übersichtsberichten über die Landwirtschaftsverhältnisse Äthiopiens wird nicht deutlich, dass die Ensete, die in anderen afrikanischen Ländern überhaupt nicht in Erscheinung tritt, für die Wirtschaft des Landes oder speziell für die Ernährung der Bevölkerung eine grössere Rolle spielt. Während die Regierung und die im Lande tätigen Agrarexperten etwa dem Getreideanbau, dem Anbau von Ölsaaten und Hülsenfrüchten sowie vor allem der Kaffeeproduktion grosse Aufmerksamkeit entgegenbringen, während dafür Versuchsgüter angelegt und Beratungsstellen eingerichtet werden, sucht man vergebens nach entsprechenden Massnahmen, die die Verbesserung der traditionellen Verfahren beim Enseteanbau und bei der Enseteverwertung zum Ziel haben.

Ein weitgehendes Desinteresse so vieler für die Entwicklung des Landes tätiger Stellen am Enseteanbau, der seinen Schwerpunkt in den Bergländern Südwestäthiopiens hat, in den gleichen Gebieten, die einen wesentlichen Teil des für die Exportwirtschaft so wichtigen Kaffees erzeugen, ist erstaunlich und muss Bedenken hervorrufen. Immerhin handelt es sich um mehrere Millionen Menschen, deren Ernährung gegenwärtig und mit aller Wahrscheinlichkeit auch in absehbarer Zukunft von der Ensete abhängig ist. Die aus Ensete hergestellte Nahrung spielt in den meisten traditionellen Anbaugebieten Südäthiopiens etwa die gleiche Rolle wie die Getreidenahrung im Norden des Landes, wo der Teff weithin die wichtigste Körnerfrucht ist. Ein Ersatz der Ensetenahrung als Grundnahrung erscheint nach allen bisher vorliegenden Untersuchungen über die wichtigsten Enseteanbaugebiete ausserordentlich schwer, wenn nicht in vielen Fällen unmöglich — wenigstens so lange, wie sich die allgemeinen wirtschaftlichen und sozialen Verhältnisse Äthiopiens nicht in ganz anderer Weise verändern, als es gegenwärtig zu beobachten ist. Damit aber ist in absehbarer Zeit aus vielerlei Gründen, die hier nicht erörtert werden können, kaum zu rechnen.

Erst vor kurzem hat Stanley² den schon verschiedentlich unternommenen Versuch erneuert, die Gesamtfläche der Enseteanbaugebiete

² S. Stanley (1966). Ensete in the Etiopian Economy. *Ethiopian Geographical Journal* 4, 30—37.

kartographisch zu erfassen. Zum ersten Mal werden von ihm auch genauere Zahlen über die in diesen Gebieten lebende Bevölkerung angegeben. Aufbauend auf älteren Untersuchungen, eigenen Forschungen und einigen inzwischen vorhandenen statistischen Unterlagen hat Stanley ein Gebiet von 66 000 qkm ermittelt, in dem die Ensete angebaut wird. Es leben darin nach seinen Schätzungen mehr als 5 Millionen Menschen. Diese Werte dürften kaum zu hoch angesetzt sein. Vor allem die Zahl der Menschen, für die die Ensete ein wichtiges oder das wichtigste Nahrungsgewächs darstellt, ist aller Wahrscheinlichkeit nach noch grösser. Es handelt sich also etwa um $\frac{1}{4}$ der Gesamtbevölkerung Äthiopiens.

Die hier vorgelegte Karte der Enseteverbreitung in der Gegenwart, die sich im wesentlichen auf Stanley, Smeds, Straube, Stiehler³ und eigene Beobachtungen stützt, mag als Übersicht für die nachfolgenden Ausführungen dienen. Sie enthält sicher noch manche Fehler und bedarf der Korrektur und Ergänzung vor allem in den Landesteilen westlich des Omo, gibt aber doch immerhin wohl ein einigermaßen richtiges Gesamtbild. Vergleicht man dieses Bild mit Karten der Niederschlagsverteilung und der natürlichen potentiellen Vegetation, dann zeigt sich, dass die Ensete im wesentlichen auf Räume beschränkt ist, die mindestens etwa 1 000 mm Niederschlag erhalten und in denen als natürliche Vegetation feuchte Bergwälder und Vegetationsformationen vom Typ der Feuchtsavanne verbreitet sind. Es sind die höheren Teile des Berglandes zwischen rund 1 500 und 3 000 m. Doch deckt sich das Gesamtverbreitungsgebiet dieser feuchtigkeitsliebenden Pflanzengesellschaft bzw. entsprechender Klimaregionen durchaus nicht mit der Ausdehnung des Enseteanbaus, vielmehr sind die entscheidenden Faktoren für die Enseteverbreitung ebenso wie für die Verbreitung anderer, auf bestimmte Teilräume Äthiopiens beschränkter Kulturpflanzen im ethnisch-kulturellen Bereich zu suchen. Gerade diese Zusammenhänge sind in jüngeren Arbeiten sehr eingehend erforscht worden, und zwar von völkerkundlicher Seite her namentlich durch Straube⁴. Nur innerhalb ganz bestimmter Kulturbereiche sind die für die Kultur der Ensete geeigneten Höhenzonen zum Anbau der Pflanze genutzt, wobei sich mannigfaltige Differenzierungen von einer monokulturartigen Stellung

³ s. Anm. 1 und 2 sowie: W. Stiehler (1949). Studien zur Landwirtschafts- und Siedlungsgeographie Äthiopiens. *Erdkunde* Bd. II, 257—282 und H. Straube (1963). *Westkuschitische Völker Süd-Äthiopiens*. Stuttgart.

⁴ s. Anm. 3.

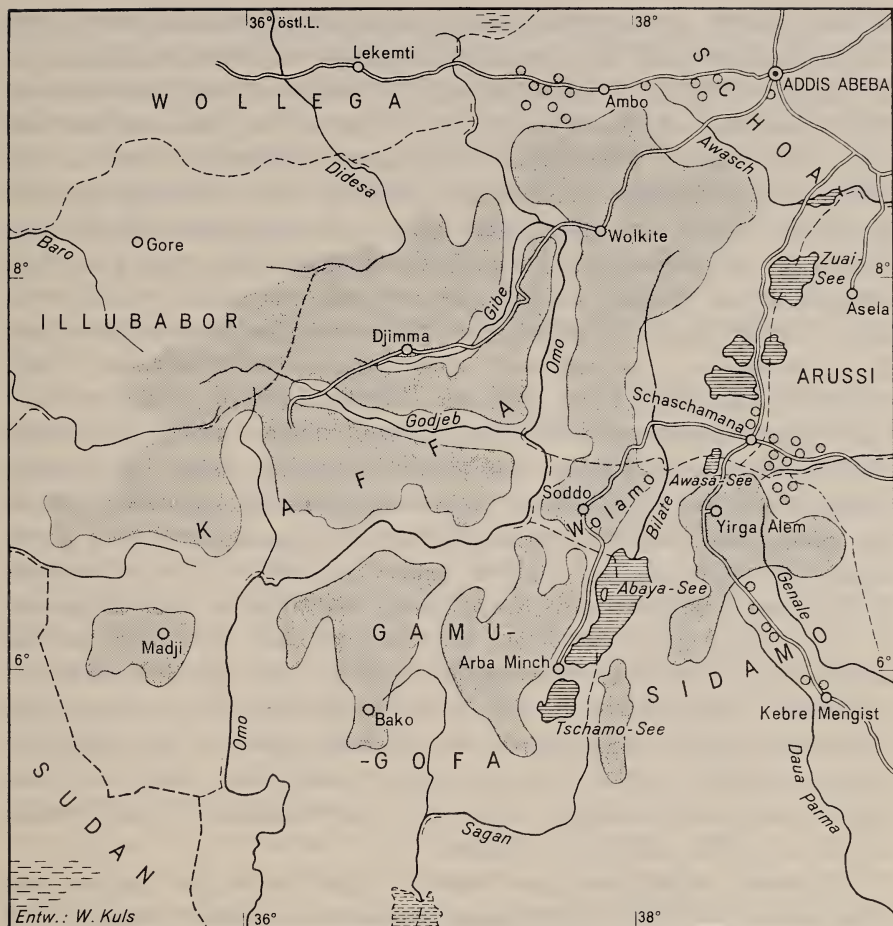
der Ensete bis zu einem mehr oder weniger sporadischen Anbau zeigen. Ohne dies näher auszuführen, muss doch für die Interpretation der Karte darauf hingewiesen werden.

Die Aufmerksamkeit soll hier darauf gelenkt werden, dass sich zwischen der vorgelegten Karte und der von Stiehler für die Zeit um etwa 1900 erarbeiteten Karte mancherlei Unterschiede zeigen. Sie sind natürlich zum Teil damit zu erklären, dass Stiehler sich auf einige recht unsichere Angaben aus der Literatur stützen musste und inzwischen sehr viel mehr Untersuchungen vorliegen, zum Teil handelt es sich aber ganz offensichtlich um beträchtliche Veränderungen in der Enseteverbreitung, was hinsichtlich der gegenwärtigen und zukünftigen Stellung des Enseteanbaus in Äthiopien Beachtung erfordert. Es lässt sich nämlich sowohl eine Zurückdrängung der Ensete aus früheren Anbaugebieten im Laufe der letzten Jahrzehnte feststellen, wie auch ein Vordringen in Räume, in denen sie noch vor einer Generation fehlte oder doch gänzlich bedeutungslos war.

Neben einer Verschiebung der Grenzen des Enseteanbaus sind zusätzlich auch manche Veränderungen in den alten Kerngebieten dieser Kulturpflanze eingetreten, die nicht minder bedeutsam erscheinen. Eine Analyse der genannten Vorgänge ist das Anliegen dieser Ausführungen, die im wesentlichen auf Beobachtungen während einer zusammen mit M. Traut mit dankenswerter Unterstützung der Deutschen Forschungsgemeinschaft durchgeführten Reise nach Äthiopien im Winter 1967/68 beruhen.

Vorangestellt seien einige orientierende Angaben zur jüngsten Entwicklung des Landes. Es soll sich lediglich um einige Hinweise handeln, die für die Beurteilung der jüngsten Veränderungen in den Enseteanbaugebieten des Südens Interesse beanspruchen.

Während kaum eines anderen Abschnittes der äthiopischen Geschichte haben sich innerhalb kürzester Zeit so zahlreiche, überall sichtbare Neuerungen ausgebreitet wie innerhalb des letzten Jahrzehnts. Fast in allen Teilen des Landes wird dem heutigen Besucher Äthiopiens deutlich, dass vieles in Bewegung geraten ist, dass alte und auch in Schilderungen aus der Gegenwart noch zu findende Vorstellungen über das Land kaum mehr Gültigkeit haben, dass das oft entworfene Bild eines in der Tradition verharrenden, weitgehend immobilen und in mancher Hinsicht einem Völkermuseum ähnelnden Landes nicht mehr zutrifft.



Verbreitung der Ensete in Südäthiopien

0 20 40 60 80 100 km



- | | |
|--|--|
|  Geschlossenes Verbreitungsgebiet der Ensete |  Häufige Vorkommen außerhalb des geschlossenen Verbreitungsgebietes |
|--|--|

Fig. 1.

Unter den vielen Neuerungen ist sicher besonders der rasche Ausbau eines leistungsfähigen Verkehrsnetzes, vor allem des Strassen- und Flugverkehrsnetzes, zu erwähnen. Immer mehr der fern von der Landeshauptstadt gelegenen Regionen können heute rasch auf dem Land- oder Luftwege erreicht werden. Das bedeutet deren Anschluss

an den Markt, es ruft eine rasch zunehmende Mobilität der Bevölkerung hervor und führt zum Eindringen von Fremdeinflüssen in bis dahin weitgehend abgeschlossene Wirtschafts- und Lebensräume. Eine bedeutsame Rolle fällt dabei den überall neu entstehenden und stark im Ausbau befindlichen Siedlungen städtischer Art zu (in Äthiopien als *Katama* bezeichnet). Noch in der Mehrzahl nicht als Städte in einem uns geläufigen Sinne anzusprechen, bilden diese Siedlungen inzwischen ein erstaunlich dichtes, allerdings in Form und hierarchischem Aufbau weitgehend von den modernen Verkehrsbändern und der Lage wirtschaftlicher Schwerpunkte beeinflusstes Netz. Sie beherbergen überwiegend eine nichtlandwirtschaftliche, ihrer ethnischen Zugehörigkeit und der wirtschaftlichen Tätigkeit nach bunt zusammengesetzte Bevölkerung, sind Träger zahlreicher neuer Einrichtungen besonders auf dem Gebiet des Schulwesens, des Gesundheitsdienstes, der Verwaltung und Landesentwicklung und übernehmen mehr und mehr die wirtschaftlichen und gesellschaftlichen Funktionen der traditionellen Märkte, indem sie sich z.T. in Anlehnung an bestehende Märkte entwickelt, häufig aber Märkte der Umgebung an sich gezogen haben. Die Bevölkerung des Umlandes solcher *Katama*-Orte kommt so in mannigfaltigen Kontakt mit bis dahin unbekannten Lebensgewohnheiten, Ernährungsformen, mit neuartigem Wirtschaftsdenken und anderen Wertvorstellungen, so dass Rückwirkungen auf ihr eigenes Verhalten kaum ausbleiben, und der Stammesverband seine bisherige Bedeutung als Rückhalt für die Verhaltensweisen mehr und mehr verliert.

Mit diesen Veränderungen läuft in allen Teilen des Landes eine ausserordentlich starke Bevölkerungsvermehrung einher. Dass in den hier interessierenden Enseteanbaugebieten die Bevölkerungsdichte schon seit langem ausserordentlich hohe Werte erreicht hat, ist bekannt. Smeds hat z.B. auf Grund seiner Studien im Hochland von Sidamo bis zu 175 Menschen pro qkm angegeben.⁵ Eigene Untersuchungen im Jahre 1954 haben zu ähnlichen Werten geführt.⁶ Sie sind durchaus nicht als Extreme anzusehen, vielmehr gibt es, besonders beiderseits der südäthiopischen Seen, enger umgrenzte Räume, in denen die Bevölkerungsdichte ländlicher Gebiete heute auf weit über

⁵ s. H. Smeds: *The Ensete Planting ...* (Anm. 1) S. 34.

⁶ W. Kuls (1958). Beiträge zur Kulturgeographie der südäthiopischen Seenregion. *Frankfurter Geographische Hefte*, 1—179.

200 oder gar 300 Menschen pro qkm angestiegen ist. Bis zur Gegenwart ist zwar immer noch keine allgemeine Volkszählung in Äthiopien durchgeführt worden, es liegen aber doch Stichprobenerhebungen bzw. vollständige Zählungen von Teilregionen vor, so z.B. von Wolamo, einem Ensete-Anbauggebiet auf der Westseite der Grabenregion. Dort leben gegenwärtig rund 600 000 Menschen, woraus sich eine Dichte von 188 Personen pro qkm errechnen lässt. Da das Tiefland von Wolamo immer noch kaum besiedelt ist, ergeben sich für die eigentlichen Anbauggebiete der Ensete weit höhere Dichtewerte, selbst wenn man lediglich das Verhältnis der landwirtschaftlichen Bevölkerung zur Fläche berücksichtigt.

Wenn es auch nicht möglich ist, sich auf frühere Zählungen zu stützen, so ist doch sicher, dass die Bevölkerungszunahme gerade in jüngster Zeit ganz ausserordentlich stark gewesen ist. Es ist dadurch zu Verdichtungen der Bevölkerung agrarischer Räume gekommen, bei denen eine weitere ausreichende Ernährung durch Erzeugnisse der eigenen Betriebe ernsthaft infrage gestellt ist. Während eines längeren Aufenthaltes in der Umgebung von Soddo, der Hauptstadt von Wolamo (Unterprovinz von Sidamo), konnten zu dieser explosionsartigen Bevölkerungsentwicklung einige aufschlussreiche Beobachtungen gesammelt werden: Die Zahl der heranwachsenden Kinder je Familie beträgt heute 5, 6, häufig auch 8 oder gar mehr. Das ist entschieden mehr als noch vor 13 Jahren, wo der Verfasser im gleichen Gebiet entsprechende Beobachtungen sammeln konnte. Auf einer freilich nur kleinen Vergleichsfläche hat die Zahl der Hütten, die etwa gleichzusetzen ist mit der Zahl der Familien, im genannten Zeitraum um rund 1/3 zugenommen, was gleichzeitig eine beträchtliche Verkleinerung der zur Verfügung stehenden Betriebsflächen bedeutet, da unbebautes Land für die Anlage neuer Höfe kaum mehr verfügbar war. Die ungemein hohe Flächenproduktivität der Ensete ermöglicht die Existenzsicherung einer Familie bereits dann, wenn auch nur etwa 0.5 ha als Anbaufläche zur Verfügung stehen. Dieser Wert ist jedoch in der Gegenwart schon häufig beträchtlich unterschritten, und bei vielen Familien ist es ganz sicher, dass die Kinder, wenn sie eine eigene Familie gründen wollen, nicht mehr mit so viel Land ausgestattet werden können, dass damit wenigstens die Ernährungsgrundlage der Familie sicherzustellen wäre. Schon heute hat deshalb die zeitweilige oder dauernde Abwanderung aus dem eigenen Stammesgebiet einen beachtlichen Umfang angenommen. Sie richtet sich namentlich auf

die Städte, vor allem auf Addis Abeba, daneben gibt es aber auch eine Wanderung in bisher wenig erschlossene oder dünn besiedelte Landesteile, in denen normalerweise wenigstens anfangs an den vertrauten Anbautechniken und Kulturpflanzen festgehalten wird, auch an der Ensete, die auf diese Weise in Gebieten auftaucht, wo sie der altansässigen Bevölkerung unbekannt war oder von dieser abgelehnt wurde.

Die zunehmende Einengung der agrarischen Lebensgrundlage wird freilich in manchen davon betroffenen traditionellen Ensete-Anbaugebieten von der Bevölkerung bisher keineswegs in ihrer ganzen Problematik empfunden. Ein wichtiger Grund dafür ist, dass der Kaffeeanbau dort, wo die klimatischen Verhältnisse ihn zulassen, zur wichtigen Einnahmequelle geworden ist und damit nicht nur ein Zukauf von Nahrungsmitteln sondern auch der Erwerb von zahlreichen Gütern industrieller Erzeugung, die überall in den Katama-Orten und auf grösseren Märkten angeboten werden, möglich wurde. Welche Gefahren jedoch mit einer einseitigen Hinwendung zur exportierenden Landwirtschaft unter Vernachlässigung der Nahrungsmittelproduktion gerade in afrikanischen Entwicklungsländern verbunden ist, braucht hier nicht ausgeführt zu werden. Schon jetzt jedenfalls ist es unter den Nahrungspflanzen mancher Kaffeeanbaugebiete vor allem die Ensete, die zurückgedrängt wird, und zwar in erster Linie deshalb, weil beide Gewächse, Kaffee und Ensete, die gleiche Fläche innerhalb der einzelnen Betriebe beanspruchen und verständlicherweise demjenigen der Vorzug gegeben wird, das ansehnliche Bareinnahmen ermöglicht. Es handelt sich um die unmittelbar an die Gehöfte angrenzenden Teile der landwirtschaftlichen Nutzfläche, die Dung erhalten, leicht beaufsichtigt und laufend gepflegt werden können. Bildete früher die Ensete überall den ersten Anbauring um die Hütte, so ist hier heute, und dafür bietet gerade das dicht besiedelte Gebiet um Soddo/Wolamo beste Beispiele, eine Vielzahl von Kaffeesträuchern zu finden, und erst am äusseren Rande oder in einem kleineren Sektor dieses Anbauringes finden sich dann oft nur noch sehr bescheidene Ensetebestände, sofern sie nicht bereits völlig fehlen. Es ist hier gewiss nicht in erster Linie eine hauptsächlich durch den Einfluss der Stadtbevölkerung beginnende Abneigung gegen die aus Ensete hergestellte Nahrung (s.u.), die zur auffälligen Vernachlässigung des Anbaus in Teilen der alten Enseteproduktionsgebiete geführt hat, sondern eben die Möglichkeit, sich am Kaffeegeschäft zu beteiligen, und die Notwendigkeit, dem Kaffee

jenen Teil der Nutzfläche einzuräumen, auf dem allein im Rahmen der bestehenden Betriebsformen ein erfolgreicher Enseteanbau möglich ist.

Ausdrücklich soll dabei betont werden, dass die Entwicklung nicht überall gleichartig verläuft, dass es eine Reihe von Gebieten gibt, in denen der Kaffee zwar gleichfalls als Marktprodukt geschätzt wird, die Ensetekultur aber trotzdem eine zentrale Stellung im Anbausystem behalten hat. Nach den mir möglichen Beobachtungen scheint dies vor allem in Gurage der Fall zu sein.

Eine weitere Veränderung im Enseteanbaugebiet von Wolamo, die anderswo kaum beobachtet wurde, muss hier noch erwähnt werden: Das ist eine beträchtliche Zunahme des Teff-Anbaus auf den etwas weiter von den Gehöften entfernt gelegenen Flächen, die bei den Wolamo und ihren südlichen Nachbarn im Gegensatz zu den Verhältnissen etwa bei den Sidamo seit jeher recht ausgedehnt waren und auf denen neben mehreren Getreidearten viele andere Gewächse, namentlich verschiedene Knollenfrüchte, angebaut wurden. Eine nun deutlich werdende Bevorzugung des Teffs, der bekanntlich nur recht bescheidene Flächenerträge liefert, ist einmal auf die starke Nachfrage in den Städten zurückzuführen, wo ja zahlreiche Zuwanderer aus den Nordprovinzen Äthiopiens leben, zum anderen aber auch auf einen zunehmenden Eigenbedarf der Bevölkerung selbst, die hier in der Ernährung, wie in vielem anderen, amharische Lebensgewohnheiten übernimmt.

Es bedarf kaum einer ausführlichen Begründung, dass eine tiefgreifende Umstellung der Ernährungsgewohnheiten in den so ungemein dicht bevölkerten Kernräumen der Ensetekultur Südäthiopiens unter den gegenwärtigen Voraussetzungen jedoch nicht möglich ist. Selbst bei Einführung von verbesserten Dünge- und Bodenbearbeitungsmethoden ist es ausgeschlossen, auf den so kleinen Betriebsflächen mit anderen Nahrungspflanzen, vor allem mit Getreidearten, die gleichen Nahrungsmengen zu erzeugen, wie mit der Ensete. Eine erhebliche Herabsetzung der agrarischen Dichte wäre erforderlich. Welche Schwierigkeiten schon durch teilweisen Ausfall der Ensete als Nahrungsgrundlage auftreten würden, wird deutlich, wenn man die in der Literatur verhältnismässig selten erwähnten Fälle studiert, in denen grössere Anbaugebiete von Pflanzenkrankheiten heimgesucht wurden ⁷.

⁷ Es ist bemerkenswert, dass über Ursachen und ökologische Bedingungen von Ensetekrankheiten bisher ausserordentlich wenig bekannt ist.

Ohne eine beträchtliche Verringerung der landwirtschaftlichen Bevölkerung durch Schaffung nichtlandwirtschaftlicher Erwerbsquellen, Abwanderung usw. wird man also im wesentlichen an den traditionellen Formen der Landwirtschaft festhalten müssen, wird man den jetzigen Zustand als das die Entscheidungsmöglichkeiten der Bevölkerung weitgehend einengende Endergebnis einer hochgradigen Spezialisierung in der Landwirtschaft anzusehen haben, wobei wohl noch manche Verbesserungen möglich sind, an eine Substitution der Ensete durch andere Anbaugewächse dagegen kaum gedacht werden kann. Dies ist es, was die Notwendigkeit, der Ensete in Äthiopien nicht weniger Aufmerksamkeit zu schenken als dem Kaffee oder Pflanzen, die sich in grossen Farmen der menschenleeren Tiefländer anbauen lassen, so dringlich erscheinen lässt. Es scheint mir bei der Beurteilung der gegenwärtigen Situation nicht richtig zu sein, davon auszugehen, dass die Ensete als Nahrungspflanze kuschitischer Feldbauerngruppen des Südens in Zukunft bei dem so rasch um sich greifenden Amharisierungsprozess, wozu eben etwa auch die Übernahme amharischer Ernährungsgewohnheiten gehört, kaum Chancen für eine langanhaltende Wertschätzung oder gar Ausbreitung hätte. Wenn sich das auch in Teilen von Wolamo zu bestätigen scheint, so sprechen doch die Beobachtungen in vielen anderen Landesteilen gegen eine Verallgemeinerung dieser öfter geäusserten Auffassung, denn tatsächlich hat die Ensete, wie eingangs schon angedeutet, in den letzten Jahrzehnten auch eine nicht unbedeutende Ausweitung ihrer Anbauareale erfahren. Verschwunden sind wohl die von Stiehler angegebenen, z.T. allerdings auch nicht sicher nachweisbaren Anbaugebiete in den Landesteilen nördlich von Addis Abeba (z.B. in Godjam), dafür gibt es ausgedehnte Flächen im Süden, auf denen die Ensete noch vor kurzem ganz fehlte. Die eigenen Beobachtungen haben keine vollständige Erfassung solcher neuen Anbaugebiete ermöglicht, so dass hier nur auf Beispiele verwiesen werden kann. Doch sind diese wohl kaum als zufällige Einzelerscheinungen zu betrachten.

Besonders auffallende Veränderungen dieser Art haben im östlichen Teil der Seenregion im Grenzgebiet von Sidamo und Darassa auf der einen Seite und Arussi sowie Gudji auf der anderen Seite stattgefunden. Teilweise handelt es sich um Gebiete, die der Verfasser zum ersten Mal im Jahre 1954 aufsuchen konnte. Auf der von Addis Abeba nach Dilla führenden Allwetterstrasse stösst man gegenwärtig erstmals südlich von Negelli im Stammesgebiet der Arussi auf grös-

sere Ensetepflanzungen innerhalb eines beiderseits der Autostrasse un-
gemein dicht besiedelten Raumes, der vor einigen Jahrzehnten noch
reines Weideland war. 1954 fiel die Nordgrenze des Enseteanbaus an
dieser Strasse noch mit der nördlichen Stammesgrenze der Sidamo am
Awasa-See zusammen. Ein geschlossenes junges Enseteanbaugebiet im
Norden von Sidamo findet sich dann vor allem an der von Schascha-
manna nach Hoch—Arussi führenden Strasse bei zunächst recht
dichter Besiedlung an der östlichen Flanke des Grabens. Jenseits der
etwa bei Kofale liegenden Wasserscheide sind dagegen die Gehöfte
auf der durch weitgespannte Täler gegliederten, fast baumlosen und
ganz überwiegend als Weide genutzten Hochfläche weit verstreut, aber
auch hier ist noch bei den meisten Siedlungen eine ansehnliche En-
setepflanzung zu finden. Erst einige Kilometer östlich des Webi ver-
schwindet dann die hier bei den Viehzüchtern ja nicht zu vermutende
Pflanze, gleichzeitig setzt ein stärkerer Anbau von Getreide ein, wobei
das Verhältnis Weideland zur Anbaufläche mehr und mehr zugunsten
der Anbaufläche verschoben wird.

Während im Hochland die Träger des Anbaus fast ausschliesslich
Arussi sind, leben in der Grabenregion neben ihnen auch zahlreiche
Siedler aus anderen Landesteilen Äthiopiens, u.a. Angehörige von Völ-
kern der Ensetekultur des Südens. Befragungen, durch die die junge
Ausdehnung der Ensete in den eben erwähnten Gebieten bestätigt
wird, ergeben u.a., dass der Hauptgrund für die Verwendung der Pflanze
sowohl im Hochland wie auch in der Grabenregion in der Sorge um
die Sicherstellung der Ernährung zu suchen ist. Andere Gründe sind
ein relativ geringer Arbeitsaufwand bei der Anlage und Pflege der
Kulturen, die Verwendung der Hacke statt des Pfluges zur Feldbe-
stellung (Zugtiere nicht erforderlich) und eine recht grosse Wider-
standsfähigkeit der Pflanze gegenüber ungünstigen Witterungseinflüs-
sen wie lange Trockenheit oder gelegentlicher Frost. Bei der geringen
Bevölkerungsdichte des Hochlandes im Südosten der Arussi-Provinz
hätten sich wohl auch andere Wege finden lassen, um das Ziel,
Sicherung der Ernährungsgrundlage, zu erreichen. Dass sich die
Arussi für die Ensete entschieden haben, ist selbstverständlich auf den
hier vorhandenen engen Kontakt mit dem alten Pflanzervolk der Sida-
mo zurückzuführen, dessen Anbaumethoden als Vorbild dienen.

Indessen lassen sich aber auch noch weitere Gründe für die Tat-
sache anführen, dass die Viehzüchter dieses Raumes in jüngerer Zeit
in so starkem Masse zum Anbau übergegangen sind und dabei der

Ensete Aufmerksamkeit geschenkt haben. Sie sind vor allem in den für sie oft sehr ungünstigen Bodeneigentumsverhältnissen zu suchen. Seit der amharischen Eroberung des Südens ist das Stammesland mehr und mehr zusammengeschrumpft, es ist entweder Staatsland geworden oder in die Hände stammesfremder Grundbesitzer gekommen, wodurch, wie an anderer Stelle dargelegt⁸, die Beibehaltung der überkommenen Lebens- und Wirtschaftsweise in zunehmendem Masse erschwert wurde. Inzwischen ist der Übergang zum sesshaften Grossviehbauerntum in grossen Teilen des Arussi-Hochlandes vollzogen, aber eine ganze Reihe von diesen Bauern verfügt nur noch über so wenig Land zum Anbau, dass dessen Nutzung durch Enseteanbau die günstigste Form der Existenzsicherung unter den gegebenen Voraussetzungen darstellt.

Es ist nicht möglich gewesen, den genauen Verlauf der gegenwärtigen Ensetegrenze nördlich und östlich von Schaschamanna festzustellen, wenigstens stellenweise liegt sie jedoch bis zu 50 km nördlich der offenbar lange Zeit stabilen Grenze zwischen den Stammesgebieten von Sidamo und Arussi.

Ähnliche Verhältnisse finden sich an der von Wondo nach Negelli/Borana führenden Strasse im Siedlungsgebiet der Gudji. Bei den hier anzutreffenden Ensetebauern handelt es sich z.T. um Darassa-Kolonisten, zu einem nicht unbedeutenden Teil aber auch um Gudji selbst, deren früherer bescheidener Anbau sich ausschliesslich auf Gerste beschränkte. Anders als im Grenzbereich Sidamo/Arussi ist an der Grenze des Sidamolandes gegen das Siedlungsgebiet der Gudji bei Arghesalam heute noch ein scharfer kurlandschaftlicher Gegensatz ausgeprägt, indem die Ensetekulturen hier zunächst schlagartig aufhören. Sie finden sich dann jedoch im Innern des Gudjilandes in mehreren, z.T. ausgedehnten Inseln vor allem in der Umgebung von Irba Moda sowie östlich von Kebre Mengist (Adola).

Ein anderes Gebiet, in dem die Ensete zwar schon länger verbreitet ist, in jüngster Zeit aber eher zu- als abgenommen hat, liegt vor den Toren der Landeshauptstadt an der in den Südwesten führenden Ausfallstrasse. Hier haben sich in grösserer Zahl Gurage niedergelassen, um als Gärtner den Gemüsebedarf der Hauptstadt zu decken. Auf kleinen, meist gepachteten Flächen können mit Hilfe von Bewässerung mehrere Ernten der verschiedensten Gemüsearten im Jahr erzielt werden. Trotz des ganz auf den Markt orientierten Anbaus wird jedoch

⁸ s. Anm. 6.

ein Teil der Fläche für die Erzeugung des Eigenbedarfs an Grundnahrungsmitteln genutzt, und so finden sich bei sehr vielen der stattlichen Hütten besonders gepflegte Ensetepflanzungen, denen sicher auch die im Gemüseanbau gewonnenen Erfahrungen zugute gekommen sind. Es wäre gerade hier im Nahverkehrsbereich der Hauptstadt sehr naheliegend, zu erwarten, dass sich inzwischen längst andere Nahrungsgewächse, etwa die Kartoffel, durchgesetzt hätten. Das ist nicht der Fall.

Die Beobachtungen über Ensetevorkommen im Gebiet westlich von Addis Abeba beiderseits der nach Lekemti und heute über den Didesa noch weiter nach Westen führenden Strasse sind schwieriger zu deuten. Die Verbreitungskarten von Stiehler, Smeds und Stanley weisen die Ensete nur in dem über 3 000 m hohen Vulkanmassiv südlich von Ambo nach. Haberland hat diesem Gebiet eine besondere Studie gewidmet⁹ und nachgewiesen, dass es sich bei den Trägern des Enseteanbaus hier um Überreste der vor dem Eindringen der Galla ansässigen Feldbau treibenden Bevölkerung handelt, die einst ein sehr viel grösseres Gebiet bewohnte, die Gallasprache annahm, jedoch ihre Wirtschaftsform und die materielle Kultur bewahren konnte. Das heute an der Strasse Addis Abeba — Ambo vereinzelt festzustellende Auftreten von Ensetepflanzungen (etwa um Ginchi) ist wohl ohne weiteres mit dem Vorkommen in dem südlich angrenzenden Bergland in Verbindung zu bringen. Aber auch sehr viel weiter westlich trifft man immer wieder auf zahlreiche Gehöfte, die von stattlichen Ensetepflanzungen umgeben sind, namentlich in der Umgebung von Gedo (192 km westlich von Addis Abeba). Erst westlich dieses eben genannten Ortes, wo die Strasse das Hochland verlässt, verschwindet die Ensete, um wenigstens bis zum Didesa nicht mehr aufzutauchen. Bei Befragungen wurde immer wieder die Auskunft gegeben, dass die Ensete »seit wenigen Jahren«, »seit einigen Jahrzehnten« kultiviert würde, in früheren Zeiten jedoch nicht. Es besteht wenig Grund, an diesen Aussagen zu zweifeln, wird doch auch in älteren Reisebeschreibungen nichts von einem Enseteanbau in diesem Teil des Landes erwähnt. Es ist zwar naheliegend, auch in diesen Vorkommen Relikte einer früher weiteren Verbreitung der Pflanze zu sehen, allem Anschein nach aber hat sie sich nicht hier gehalten, sondern (erneut) Verbreitung gefunden als

⁹ E. Haberland (1960.) Bemerkungen zur Kultur und Sprache der Galila im Wonči-See. *Rass. di Studi Etiopica* XVI, 5—22.

ein Nahrungsgewächs, das vor allem der hohen Ertragssicherheit und des relativ geringen Arbeitsaufwandes wegen geschätzt wird. Zum Teil ist die Ensete von Siedlern aus alten Anbaugebieten mitgebracht worden, überwiegend handelt es sich bei den Bauern, die sie in ihre Pflanzungen aufgenommen haben, in diesem Landesteil jedoch um Galla. Ihre Bereitschaft, die ihnen bisher nicht vertraute Pflanze als eine wesentliche Grundlage für die eigene Ernährung zu akzeptieren, ist sicher zu einem Teil in der häufig sehr bescheidenen Landausstattung begründet, ebenso aber auch in dem weit verbreiteten Pachtwesen, bei dem der Verpächter hohe Anteile an der Ernte erhält, jedoch an Getreide, Ölsaaten und Hülsenfrüchten interessiert ist, nicht an der auf kleiner hausnaher Fläche angebauten Ensete.

Es scheint, dass die Voraussetzungen für eine weitere Ausbreitung der Ensete eben vor allem in den von Galla bewohnten Teilen Süd-äthiopiens günstig sind¹⁰, während mit einem Eindringen in Gebiete amharischer Siedlungen kaum zu rechnen ist. Hier ist die Auffassung, dass die Ensete minderwertige Nahrung unterworfenen, kulturell nicht auf der gleichen Ebene stehender Völker sei, dass ihr Genuss einem Amharen nicht zugemutet werden könne, nach wie vor fast allgemein verbreitet, und ob Versuche, sie zur Verminderung der Gefahr von Missernten in nördlichen Landesteilen einzuführen, Erfolg haben werden, ist doch sehr fraglich. Sie ist heute etwa im nördlichen Schoa, in Godjam oder auch Begemeder keineswegs selten zu sehen, immer aber nur in wenigen Exemplaren dicht bei den Häusern, um die Blätter zum Verpacken von anderer Nahrung (auch beim Rösten) zu benutzen. Auch als Zierpflanze findet sie Verwendung; die Frage, ob man wenigstens gelegentlich auch Nahrung daraus bereitet, wird jedoch stets energisch verneint.

Die einleitend wiedergegebene, weit verbreitete Auffassung vom Enseteanbau als einer mehr und mehr an Bedeutung verlierenden Relikterscheinung dürfte nach den hier dargelegten Beobachtungen kaum mehr vertretbar sein. Ein grosser und vielleicht zunehmender Teil der Bevölkerung des äthiopischen Hochlandes wird auch in Zukunft auf diese Kulturpflanze als Nahrungsgrundlage angewiesen sein und durch sie ein relativ hohes Mass an Sicherheit in der Ernährung erhalten. Um so notwendiger erscheint es, die Bedingungen des Anbaus, die Möglichkeiten von Verbesserungen in der Kultur und die

¹⁰ vergl. hierzu auch die Angaben von S. Stanley (Anm. 2) S. 36.

Gefährdung durch Krankheiten in der regionalen Vielfalt zu studieren und gleichzeitig im Interesse der wirtschaftlichen Entwicklung von Enseteanbaugebieten nach besseren und zusätzlichen Verwertungsmöglichkeiten zu suchen. Selbst wenn der heute in grossen Teilen Südwestäthiopiens wirtschaftlich im Vordergrund stehende Kaffeeanbau seine jetzige Bedeutung behält oder gar noch erhöhen kann, ist damit bestenfalls für einen Teil der so zahlreichen Bevölkerung die Existenzgrundlage gesichert. Die Höhenzone des Kaffeeanbaus ist beträchtlich schmäler als die des Enseteanbaus, und gerade für die zwischen rund 2 500 und 3 000 m gelegenen Höhengebiete dürfte sich nur schwer ein Anbauprodukt finden lassen, das die Ensete in ihrer zentralen Stellung im Wirtschaftsleben ersetzen könnte.

CHANGES OF FARM SIZE STRUCTURE IN FINLAND, 1959—1964

by

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Finland is still, compared with the Scandinavian countries, a country of small agricultural holdings. In 1964 holdings of 2—5 hectares arable area comprised 30 % of the total number of holdings. However, since 1959, within this size group there has been a considerable decrease in both number of holdings and also of arable area. This statement, like further statements, are based upon samples concerning the period 1959 to 1964, made by the Board of Agriculture. The samples included 98 rural communes and the purpose was to obtain information about the number of agricultural units and their arable area during the period mentioned. The Board of Agriculture has calculated the figures for five regions (Fig. 1) and by using coefficients based on the agricultural census for 1959 has achieved values concerning the whole country (Table 1). Only holdings with more than two hectares of arable area has been included. The number of holdings in the whole country decreased by 0.47 %, while, on the other hand, the arable area has increased by 3.15 %. For comparison it can be mentioned that during the period 1950—59 the number of agricultural units actually increased by more than 8 % (Smeds 1962, p. 4). The fact that the arable area has continued to increase, while we have a slight decrease in number of holdings indicate continuous clearing of land. It is mainly the cold farming areas in Lappi and northern Middle Finland, that are responsible for the majority of the additional arable area. As late as in 1959 a law was passed concerning the establishing of new cold farms, most of which were developed in northern Finland, the area with the



Fig. 1. Investigation areas of the Board of Agriculture.

largest amount of land available for reclamation (Smeds-Fogelberg 1967, p. 29). Also, farms that were established just before 1959 probably affected the increase in acreage, since cold farms start with at the most 10 % of the supposed arable area already cleared (Smeds 1963, p. 8).

During the period 1959—64 an increase in the number of holdings has taken place in all the size groups except for those of 2—5 and 25—30 hectares. Relatively the increase has been greatest in the size groups of 10—15 and 15—20 hectares, while the absolute number of holdings has grown most in the size group of 5—10 hectares. During the fifties the absolute number of holdings increased most in the size group of 2—5 hectares, while the biggest increase in acreage took place in the size group of 5—10 hectares. The increase in acreage has not always kept up with the increase in number of farms, which is perhaps a reason for the slight decrease in mean arable area per holding in several size groups during the period investigated (Table 2). This might also partly be due to the fact that in many places fields have been planted with forest, especially in the southern part of the country. In 1964 86.5 % of all holdings were still smaller than 15 hectares. The corresponding figure for 1959 is 87.3 %, so we can see a small trend towards bigger and apparently also fewer agricultural units. Mean acreage per holding for the whole country (9.1 hectares) is still much below what in

Table 1. The table shows the estimated values for the whole country. Source: Monthly Review of Agricultural Statistics, 11:1966.

Region	Number of holdings		Arable area in hectares	
	1959	1964	Change in per cent	Change in per cent
Etelä-Suomi	97,915	96,431	-1.5	+ 1.7
Sisä-Suomi	92,541	93,142	+ 0.6	+ 5.1
Etelä-Pohjanmaa	42,396	41,639	-1.8	+ 0.4
Pohjois-Pohjanmaa	26,420	25,212	-4.6	+ 1.7
Koillis-Suomi	34,861	36,320	+ 4.2	+ 11.9
Whole country	294,133	292,744	-0.5	+ 3.15
Mean acreage per holding 1959 8.8 hectares and 1964 9.1 hectares.				

Table 2. For the sample the Board of Agriculture has got a very slight increase of holdings, while it for the whole country has got a decrease of 0.5 %. The mean arable area too, is different for the sample and the whole country. Source: Monthly Review of Agricultural Statistics, 11:1966.

Size group	Number of holdings		Arable area in hectares		Mean arable area per holding in hectares	
	1959	1964	Changes in per cent	Changes in per cent	1959	1964
2-5	23,970	21,697	- 9.5	13.0	3.38	3.42
5-10	23,224	24,221	+ 4.3	30.5	7.15	7.20
10-15	9,830	10,616	+ 8.0	22.4	12.23	12.10
15-20	3,863	4,293	+ 11.1	12.9	17.15	17.22
20-25	1,608	1,677	+ 4.3	6.5	22.35	22.25
25-30	858	851	- 0.8	4.0	27.40	27.15
30-50	918	944	+ 2.8	6.1	36.90	37.01
>50	292	298	+ 2.1	4.4	82.75	84.51
Whole sample	64,671	64,597	+ 0.05	100.0	8.58	8.85
					+ 3.6	+ 3.15

Sweden is estimated to be the profitable minimum size of holdings, 10 hectares.

A closer look upon the five main areas indicate that a decrease of holdings has taken place in Etelä-Suomi, Etelä-Pohjanmaa and Pohjois-Pohjanmaa districts, whereas, as could be expected, the number of farms has increased in Sisä-Suomi and Koillis-Suomi. The arable area has increased in all regions, the biggest increase (nearly 12 %) being in Koillis-Suomi. All regions have a reduction of number and acreage in the size group of 2—5 hectares, while also the size group of 5—10 hectares has diminished in Etelä-Suomi, Etelä-Pohjanmaa and Pohjois-Pohjanmaa. Within the region of Etelä-Suomi, furthermore, the size group of 25—30 hectares has diminished. Etelä- and Pohjois-Pohjanmaa show decreases in several size groups both in total numbers as well as acreage. In Sisä-Suomi as well, the biggest size group has decreased, while the total number of holdings has increased by 0.6 % and the acreage by 5.1 %. The greatest changes have no doubt been in Koillis-Suomi. The number of agricultural units has risen by 4.2 % and the arable area by 11.9 %. A decrease can be noted in the smallest and the two biggest size groups.

Next we will examine developments in farm size within the communes. The figures represent only the samples mentioned above. The size group of 2—5 hectares has been reduced in nearly all communes. The greatest number of holdings in this group are to be found in northern and eastern Finland and the archipelago. In communes like Suomussalmi, Posio, Paltamo, some North Karelian communes and Brändö, holdings with 2—5 hectares arable area comprised more than 50 % of the total number. In Posio they comprised 50 % of the acreage as well (Fig. 2—6). In general, less than 25 % of the arable area is occupied by them and in southern Finland even less than 10 %. The cultivated area has, as a rule, decreased in this size group. Some degree of increase can be seen in the archipelago and in northern Finland, where it probably is a result of new settlement. The changes in mean acreage show a fairly uneven distribution with the majority of the increase in the north and the east. The size group of 5—10 hectares, as mentioned, has decreased in number of holdings in southern Finland and in Pohjanmaa, while Middle Finland and northern Finland experienced an increase. The increase has been very strong in the northern part of the Lake region and in Lapland. Communes with many large holdings usually have decreasing numbers of farms in the 5—10 hectares

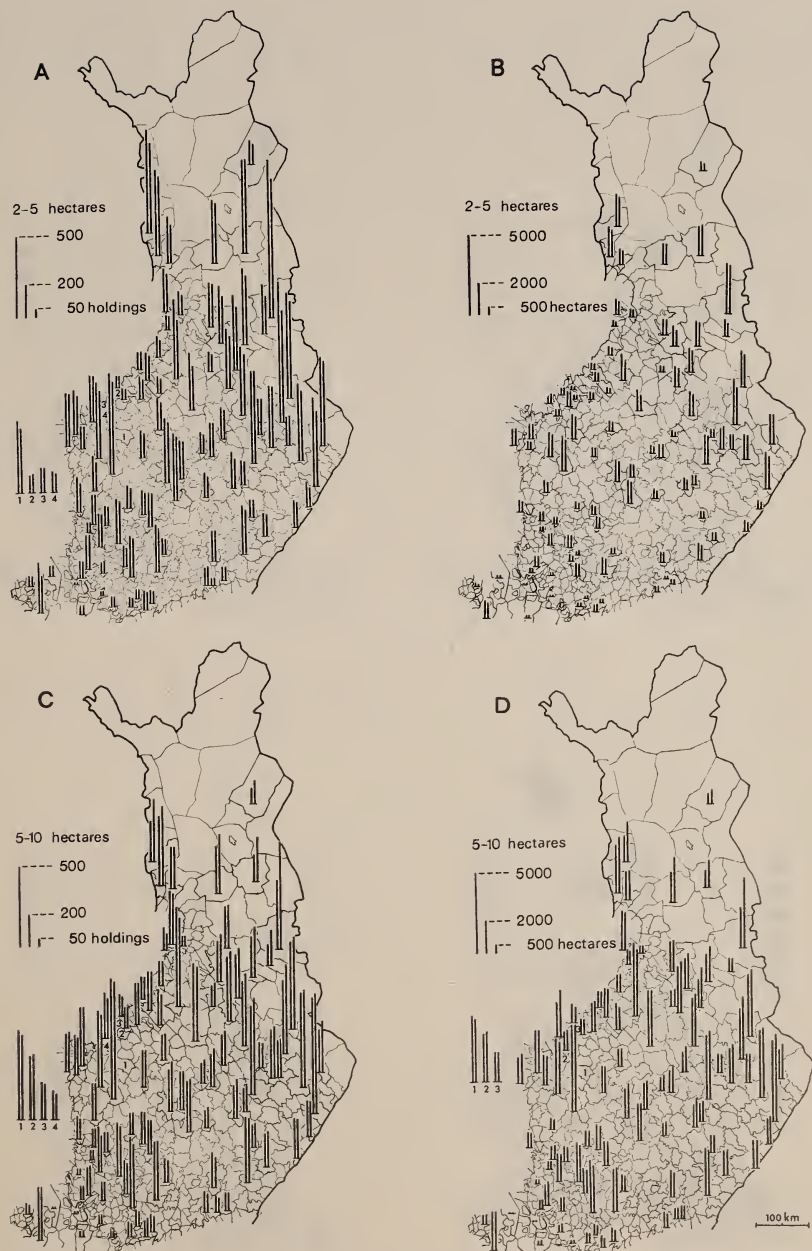


Fig. 2. A. Number of holdings of size group 2–5 hectares. 1959 left, 1964 right. B. Arable area of size group 2–5 hectares. 1959 left, 1964 right. C. Number of holdings of size group 5–10 hectares. 1959 left, 1964 right. D. Arable area of size group 5–10 hectares. 1959 left, 1964 right.

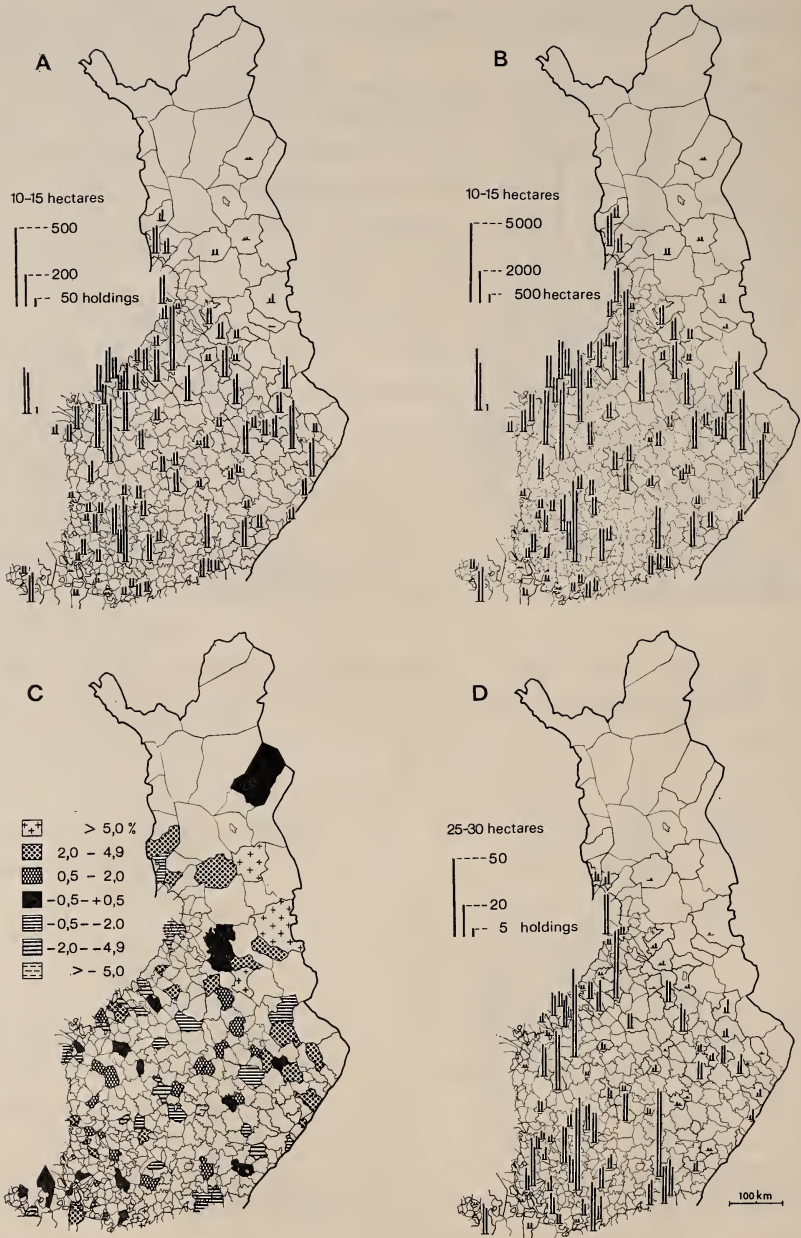


Fig. 3. A. Number of holdings of size group 10–15 hectares. B. Arable area of size group 10–15 hectares. C. Mean acreage for size group 2–5 hectares. Relative changes from 1959 to 1964. D. Number of holdings of size group 25–30 hectares. The four largest size groups all have nearly the same distribution.

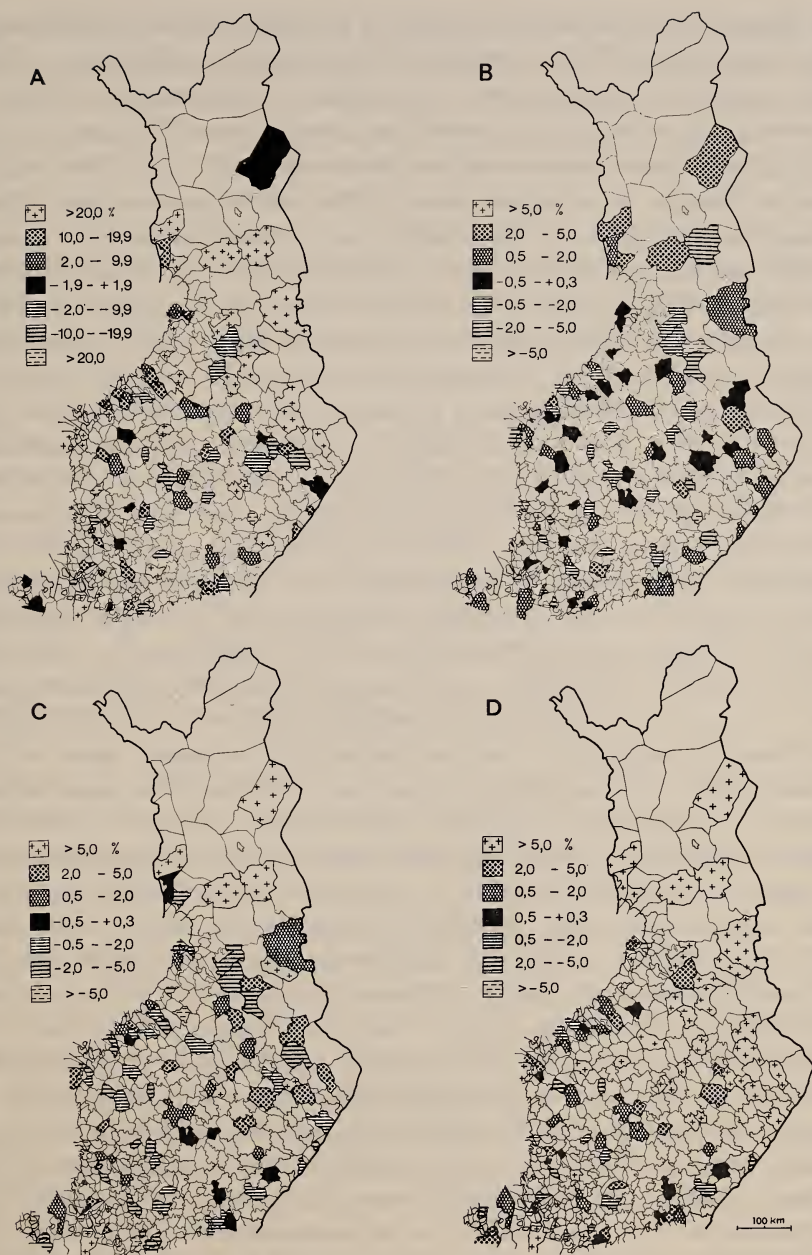


Fig. 4. A. Relative changes in number of holdings from 1959 to 1964 in size group 15—20 hectares. B. Mean acreage for size group 15—20 hectares. Relative changes from 1959 to 1964. C. Relative changes in total number of holdings from 1959 to 1964 per commune. D. Relative changes in total arable area from 1959 to 1964 per commune.

size group, but also some parishes in the Lake region and Suomen-selkä region have fewer holdings in this group in 1964 than in 1959. The changes in acreage are not as easily interpreted as those in numbers, but acreage in general has grown more than numbers of holdings and mean arable area has increased by 0.7 %. Here too, the greatest changes have taken place in the north and the east. Mean acreage in other parts of the country has remained relatively constant. In southern Finland changes over 5 % occur in this group only in Inkoo and Pohja. The size group of 10—15 hectares is actually represented in a considerably smaller degree in northern Finland than the preceding groups. This group has increased throughout the entire country. A few communes with decreasing numbers exist, but they are not concentrated within any special region. Cultivated land has decreased in some southern communes, as well as in some parts of Pohjanmaa. The relative growth of the number of holdings again has been greatest in the northeast, while the relative decrease has taken place in the southwest. With regard to both acreage and numbers the size groups of 5—10 and 10—15 hectares held the majority of the farms (1959 52.0 and 51.2 % respectively, 1964 52.9 and 53.9 % respectively of the total). Mean acreage has been even more constant in the 10—15 hectare group than in the 5—10. Within the following group, that of 15—20 hectares, we have an irregularity in the pattern of changes, that is also characteristic of the following size groups. Like the other large holding groups, this group also is most important in southern Finland and Middle Pohjanmaa. In the Kuopio-region, however, these groups are of some importance, especially in acreage. The relative changes of mean acreage rarely rise above 5 % and in most cases are less than 2 %. The following groups are mainly represented southwest of a line between Kemi-Kajani-Lieksa. The size group of 25—30 hectares has diminished in the whole sample both in number and arable area. Increases are found in Somero, Siuntio, Aura, Köyliö and Pernaja in the south of Finland. In Pohjanmaa, Toholampi and Nivala show increases. The group is particularly uncommon in Sisä-Suomi. The two remaining groups have a similar extension. The holdings with 30—50 hectares of cultivated area have increased in number in all regions but Koillis-Suomi. However, there is a decrease in many communes throughout the country. The group over 50 hectares has decreased in most of the country. Nevertheless, in many communes within Etelä-Suomi and for the region as a whole, there has been a slight increase.

Mean acreage in the last two groups has increased to a considerable degree, especially on farms over 50 hectares (+ 1.76 hectares or 2.1 %).

For the whole country a slight move towards larger and fewer farms can be noted. For the first time there has been a decrease in total number of farms. Decreases have mostly taken place in Etelä-Suomi, but in Pohjanmaa too, there has been a decrease in agricultural units in most of the communes investigated. The number of holdings has grown in Sisä-Suomi and Lapland. Communes like Juuka, Kajaani rural commune, Vaala and Utajärvi, somewhat surprisingly, have a decreasing number of holdings. Relatively acreage has increased over 5 % in whole Koillis-Suomi and most of Sisä-Suomi. Communes with diminishing cultivated area are found only in Etelä-Suomi and Middle Pohjanmaa. Mean acreage of the holdings decreased only in 12 of the communes investigated, in most of them less than 0.5 % (Fig. 4, C and D). In the future we will probably have a further development in the same direction, especially since the foundation of new cold farms is to stop and splitting up of holdings is no longer done to the same extent as earlier. The cumulative curves of 1959 and 1964 are nearly the same. The changes of the size group of 2—5 hectares are the only ones that seem worthy of noting. This too, indicates that the development has reached a changing point (Fig. 7).

For some communes, Inkoo, Nauvo and Karjalohja in Etelä-Suomi and Anttola in Sisä-Suomi, further investigations have been made to ascertain the main reasons for the changes. For this the income assessments of the farms of the investigated areas has been analyzed for the periods 1959—64 and 1965—66. First, a continued decrease in farm numbers has taken place from 1965 to 1966. Second, the arable area has diminished little in Inkoo and Karjalohja, while in Nauvo and Anttola it has been relatively constant (slight decrease) 1965—66. It was found that 15—24 % of the farms in the areas investigated changed in size group between 1959 and 1964 and 3—5 % during 1965—66. Many of the changes have been in opposite directions and thus do not show in the sum of the holdings. During the first period, Karjalohja excluded, more farms have changed from lower to higher size groups, while during the later period only Nauvo has more in that direction. The reasons for changed acreages are often mentioned in the income assessments and are as follows: clearing of land, splitting up of farms, buying and selling arable area, planting fields with forest, consolidation of holdings, changed tenancy and several other reasons, as for example,

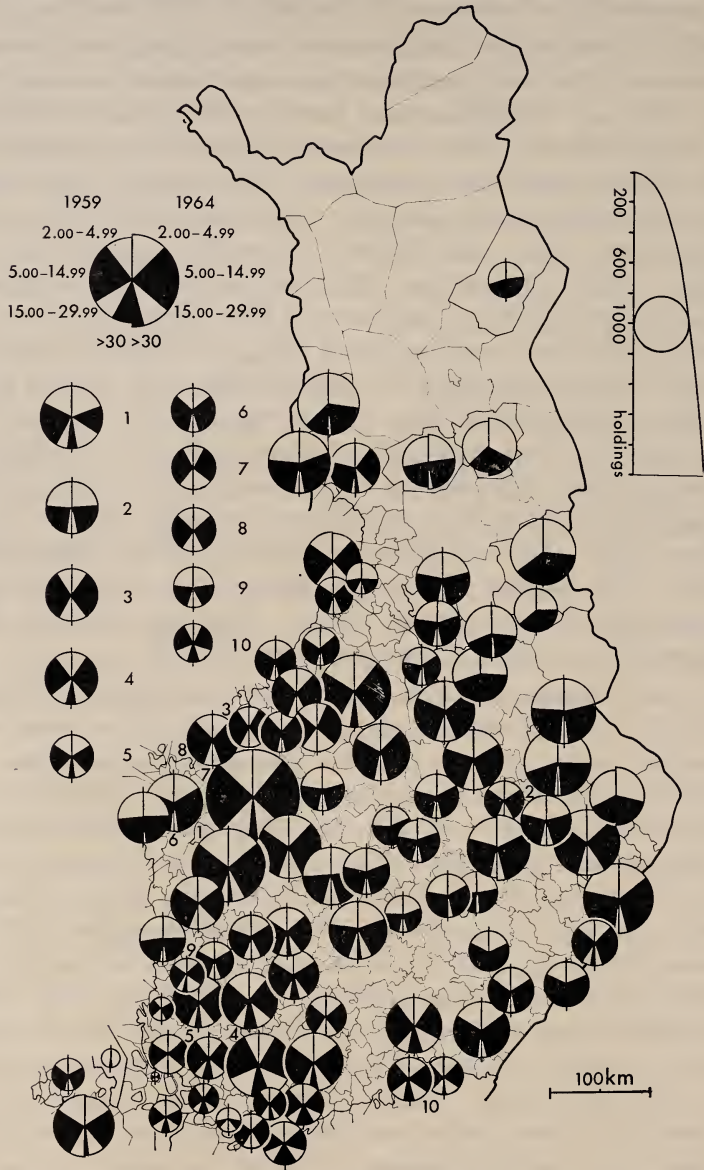


Fig. 5. Number of holdings 1959 and 1964. Circles are proportional to number of holdings and sectors to the different size groups.

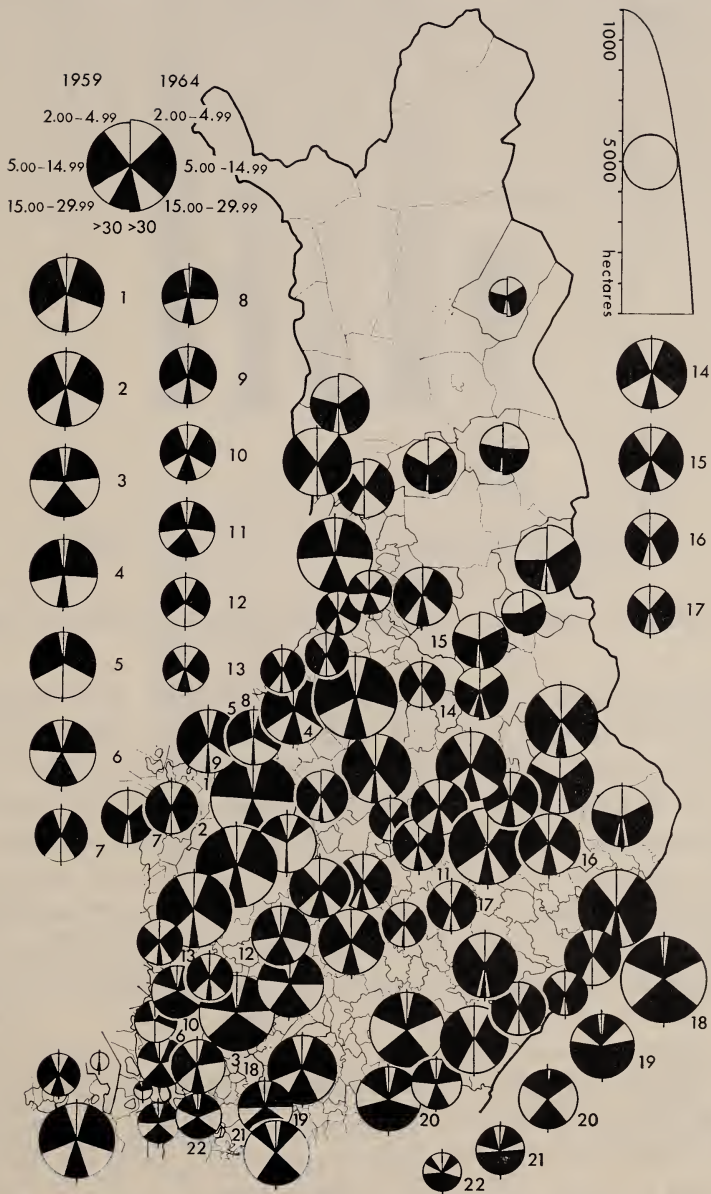


Fig. 6. Arable area in hectares 1959 and 1964. Circles are proportional to arable area and sectors to the different size groups.

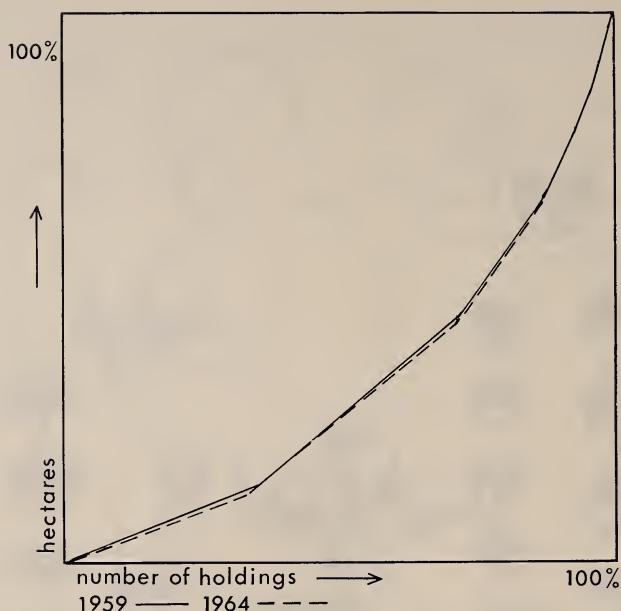


Fig. 7. Number of holdings in relation to arable area. Cumulative frequencies.

abandonment owing to sickness and so forth (Fig. 8). For a small group of changes the reasons could not be ascertained. In 1959–64, reclamation of new fields, mostly from meadow, still occurred in all areas. Anttola in Sisä-Suomi had the highest percentage (28 %) of land clearing. During the later period no clearing of new land has been made with the exception of one farm in Nauvo. Now changed tenancy is the most important reason. Anttola also has the greatest percentage of division of holdings, while both the buying and the selling of farms has been rather common during both periods in Karjalohja. In Nauvo, Inkoo and Karjalohja the share of unknown reasons is surprisingly high, since there has been a new land classification between 1959 and 1964. Selling of holdings and planting of forest play rather a small part. In Inkoo a considerable consolidation of farms can be noted. With regard to the buying of new fields, in nearly all cases the agricultural units were less than 2 hectares of arable land.

It is impossible to draw any conclusions based only on the four examples mentioned, but according to what we know about the land clearing activities it is possible to assume that in northern Finland the

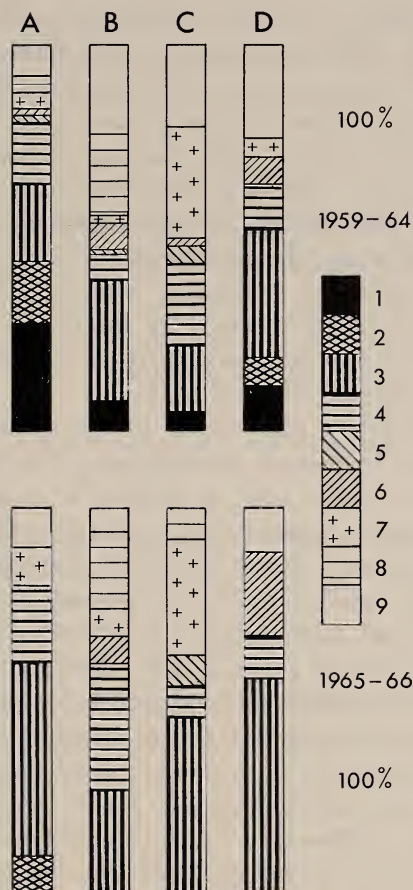


Fig. 8. Main reasons for changes of size group. 1. land clearing, 2. division of holdings, 3. changed tenancy conditions, 4. buying of newholdings, 5. planting of forest, 6. other reasons, 7. selling of arable area, 8. consolidation of holdings, 9. unknown reasons. A = Anttola, B = Inkoo, C = Karjalohja, D = Nauvo.

clearing of land is the most important reason of changing size group. In southern Finland tenancy conditions, consolidation of farms and buying and selling are the most obvious reasons, as also was the case during the period 1950—59 (Smeds 1966, p. 102).

The development towards bigger and fewer holdings in the farming structure, which seems to have begun also in Finland has been influenced by several reasons. One of these is the depopulation of the countryside and in connection with that the process of urbanization

which makes the group of people dependent on agriculture decrease more and more. In 1960 the degree of urbanization passed the 50 % limit. It is mainly young people, who abandon the countryside and change from farming to other sources of livelihood. The population of the countryside mainly due to this has an old aged structure. The number of children per family also has decreased. As a consequence of this agricultural holdings are no more split up to the same extent as earlier and the holdings, the owners of which have moved away, are usually rented or sold to the remaining farmers. The state now grants loans on relatively favourable terms for buying of new fields and for redemption of sisters and brothers parts as to encourage the development of more profitable farming units.

The present legislation also works in the same direction. In the laws of 1958 concerning ground arrangements it is said that new farms ought to get enough arable area to support a mean size family, with regard also to the forest supplies of the holdings. The maximum arable area given to such farms is fixed to an area corresponding to 20 transformed hectares of arable land (in Lapland it is 30 transformed hectares). With regard to the same laws additional area (mainly from state owned areas) can be given to too small holdings resulting from earlier colonization or splitting up of larger holdings.

Thus the policy is to prevent the developing of new unprofitable farms and also to eliminate now existing such units and it looks like there has already been some success in these attempts as the number of farms is no more increasing. As the foundation of new cold farms and thus the clearing of land will gradually cease, the enlargement of arable units in the future will mainly be due to buying of new areas and thus will promote a faster rationalization of the farms of the smallest size groups.

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DIE GLAZIALLANDSCHAFT DES SÜDCHILENISCHEN SEENGEBIETES

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Die Erforschung der pleistozänen Vorlandvergletscherung am westlichen Andenabfall des südlichen Chile ist noch sehr jung. Sie kann auf keine so reiche Tradition zurückblicken wie die am Ostabfall der Anden in Patagonien. Dort hat Caldenius schon im Jahre 1932 eine erste grosse Zusammenfassung über die quartäre Vereisung gegeben. Seitdem hat sich eine ganze Forschergeneration zahlreichen Spezialproblemen gewidmet, so dass heute die pleistozäne Landschaftsgeschichte Ostpatagoniens hinreichend bekannt ist. Ich möchte hier vor allem auf die Arbeiten Auers, zugleich auf die vielen Einzelstudien verschiedener Gelehrter hinweisen (Literatur bei Auer 1956, 1958 a, 1958 b, 1959, 1965 und Czajka 1957). Die klimatischen Gegensätze beider Abdachungen mögen ein äusserer Grund dafür sein, dass die quartäre andine Vorlandvergletscherung eine so unterschiedliche Erforschung erfahren hat. Ostpatagonien, im klimatischen Lee der Anden gelegen, ist ein durchgängiges, offenes Steppen- oder Waldland. Südchile und Westpatagonien, im klimatischen Luv der Anden, sind unter einem dichten Waldkleid verhüllt und verbergen dadurch ihren Formenschatz. Darüber hinaus bleiben als Studienobjekt für die quartäre Vorlandvergletscherung nur das südchilenische Seengebiet und die Insel Chiloé, da Westpatagoniens Vorland ins Meer abgetaucht ist und einen verwirrenden Inselarchipel darstellt, der Untersuchungen über die glazialen Formen erschwert.

Studien über glazialmorphologische Probleme in Südchile waren bis vor wenigen Jahren spärlich, doch war der Formenschatz keineswegs

unbekannt. Wir verdanken J. Brüggén für den Bereich des südchilenischen Seengebietes folgende wichtige Erkenntnisse:

1. Die Bildung und Formung der südchilenischen Seen ist wie im Alpenvorland einer Vorlandvergletscherung zu danken.
2. Die Längssenke ist bis zum Ostabfall des Küstenberglandes mit eiszeitlichen Ablagerungen (Moränen und Fluvioglazial) aufgefüllt.
3. Im südchilenischen Längstal finden sich vermutlich Ablagerungen zweier Vereisungsperioden.

Brüggén hat seine Auffassungen schon 1929 dargelegt und nach einigen kleinen Zusatzbeobachtungen (1945, 1946, 1948) im Jahre 1950 noch einmal zusammengefasst. So deutet er zum Beispiel die den Llanquihue-See nach Westen abschliessenden drei hohen Moränenwälle als Rückzugsmoränen der letzten Vereisung. Die eigentliche Endmoräne des letzten Glazials lokalisierte er bei Fresia ca. 30 km westlich des Sees. Anzeichen älterer Vereisungsperioden glaubte er bei Trumao am Rio Bueno und bei Punta Godoy an der Mündung des Maullin-Flusses entdeckt zu haben (1929, p. 22 und 1950, p. 232). Den klaren Nachweis von Ablagerungen einer vorletzten Vereisung hat Brüggén nur für Zentralchile geführt (1946, p. 39). Eine noch ältere Vereisung hat er vermutet, aber mehr aus Analogie zu Europa erschlossen als sicher nachgewiesen (1946, p.34 und p.39).

Ein erstes glazialmorphologisches Querprofil in der Höhe des Puyehue-Sees bei Osorno hat Weischet (1958) aufgrund einer Geländeaufnahme im Mai 1956 auf dem Würzburger Geographentag 1957 vorgelegt (1958 b, p. 161/162, 1958 a und 1964). Seine Studien gipfeln in der Erkenntnis eines Nachweises von vier Moränenablagerungskomplexen, die er vier Eiszeiten zuordnet. H. Illies (1960 und 1967) und der Verfasser (1957) kamen bei ihren Geländearbeiten 1956/57 zu der Meinung, dass Ablagerungen dreier Eiszeiten gut nachweisbar sind.¹

Als Arbeitsunterlagen standen in den Jahren 1956—1958 die "carta preliminar de Chile" 1:250 000 und Trimetrogon-Luftaufnahmen aus dem Jahre 1943 im Massstab von ca. 1:35 000 und im Jahre 1966 zusätzlich Senkrechtluftbilder einzelner Gebiete im Massstab von ca. 1:35 000 (Befliegung 1961) zur Verfügung.

¹ H. Illies und der Verfasser hatten während ihrer Arbeiten in Valdivia 1956/57 häufig die Gelegenheit, Fragen der quartären Landschaftsentwicklung auf gemeinsamen Reisen im Raum von Valdivia zu diskutieren. Meine Studien konnten 1958 und 1966 fortgesetzt werden.

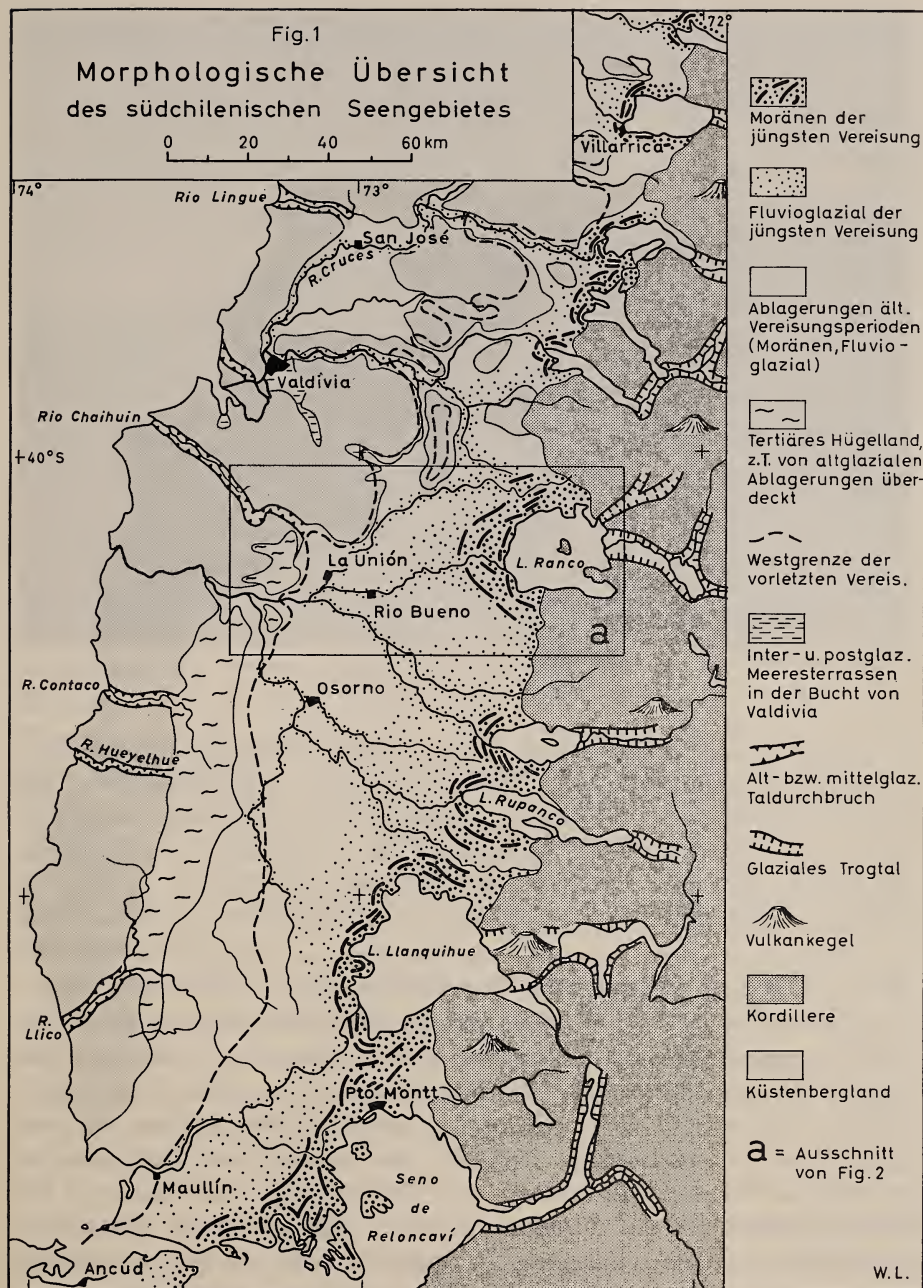


Fig. 1. Morphologische Übersicht.



Fig. 2. Vulkan Osorno.

Der *Untersuchungsraum* des südchilenischen Seengebietes hat eine Nord-Süd-Erstreckung von ca. 300 km und eine westöstliche von 200 km. Die für viele Teile Chiles charakteristische meridionale Reliefgliederung in Küstenbergland (Cordillera de la Costa) — Längssenke (Valle meridional) — Hochkordillere (Cordillera de los Andes) ist deutlich ausgebildet (Fig. 1). Das *Küstenbergland* ist ein kristallines Rumpfschollengebirge vom Mittelgebirgstyp mit Höhen um 300 bis 600 m und gut ausgeprägten Verebnungsflächen. Auch die *Hochkordilleren* machen keineswegs einen ausgesprochen alpinen Eindruck. Auf einem mässig hohen Gebirgssockel von Höhen um 1 500 m, bestehend aus vulkanischen Tiefen- und Ergussgesteinen, sitzen im wesentlichen auf zwei NNE/SSW gerichteten grossen Schwächelinien einzelne junge, zum Teil noch tätige Vulkane oder etwas ältere Vulkanruinen auf, die bis knapp 3 000 m aufragen (Fig. 2). Die Zerschneidung des Gebirgskörpers ist an einzelne, kräftig eingeschnittene Haupttäler gebunden, die von Gletschern ausgeformt sind, daher u-förmigen Querschnitt besitzen und nicht selten von Seen ausgefüllt werden. Auffallendstens Merkmal am Rande des Gebirges sind ost-west-

gerichtete, meist langgestreckte Seen, die mit ihren Enden im Gebirgskörper liegen, mit ihrem vorderen Teil jedoch zungenförmig in die Längssenke hinausragen. Den Vorlandseen im Bereich der Alpen physiognomisch nicht unähnlich, sind sie gleichermassen auch in ihrer Genese durch glazigene Vorgänge entstanden (Fig. 1). Zwischen dem Küstenbergland und den Kordilleren ist die *Längssenke* als eine tektonische Tiefenzone eingelagert: ein flachgewelltes Land, dessen Untergrund die Strukturmerkmale des Küstenberglandes trägt, dessen oberflächliche Ablagerungen neben Resten des Tertiärs aber aus eiszeitlichen Sedimenten bestehen. Nur im Bereich der Provinz Valdivia durchragen einzelne kristalline Schollen die Längssenke. Die grossen Flüsse queren die Senke und durchbrechen meist die Küstenkordillere in ost-westlicher Richtung auf den Pazifischen Ozean hin (Fig. 1).

DIE JUNG MORÄNENLANDSCHAFT

Im äusseren Habitus hat die südchilenische jungglaziale Landschaft eine auffallende Ähnlichkeit mit der des Alpenvorlandes. Von den vergletscherten Anden gingen während der Vereisungsepochen grosse Eisströme zu Tal und breiteten sich zungenförmig im Vorland aus. Obwohl man eine geschlossene, wenn auch zerlappte Eisvorlandfront etwa vom Ranco-See an südwärts vermuten kann, floss die Masse des Eises in vorgezeichneten Tälern ab. Im Vorland erweiterten sich die Eisströme zungenförmig in breiteren Becken, die den voralpinen Zungenbecken entsprechen. Einzelne dieser Täler und die meisten der Becken sind wassererfüllt und beherbergen die malerischen südchilenischen Seen.

Der Lago Riñihue zum Beispiel ist in ein schmales Trogtal eingebettet, das an seinem Westende in zwei Teilbecken aufgespaltet ist, getrennt durch einen rd. 1 000 m hohen Berg, den Cerro Tralcán. Beide buchtförmigen Ausweitungen sind umgeben von mindestens zwei grossen, halbkreisförmigen, den See etwa 100 m überragenden Wällen, die ihn zugleich nach Westen abschliessen. Die Wallform ist äusserst frisch mit steilem Anstieg auf der Innen- und flacherem Abfall auf der Aussenseite. Zwischen den Wällen und vom jüngsten Wall zum See hin sind deutlich sechs Seeterrassen ausgebildet, die frühere Wasserspiegelstände des Sees erkennen lassen.

Der mehr gerundete Lago Ranco (Fig. 3) mit seinem heute 70 m

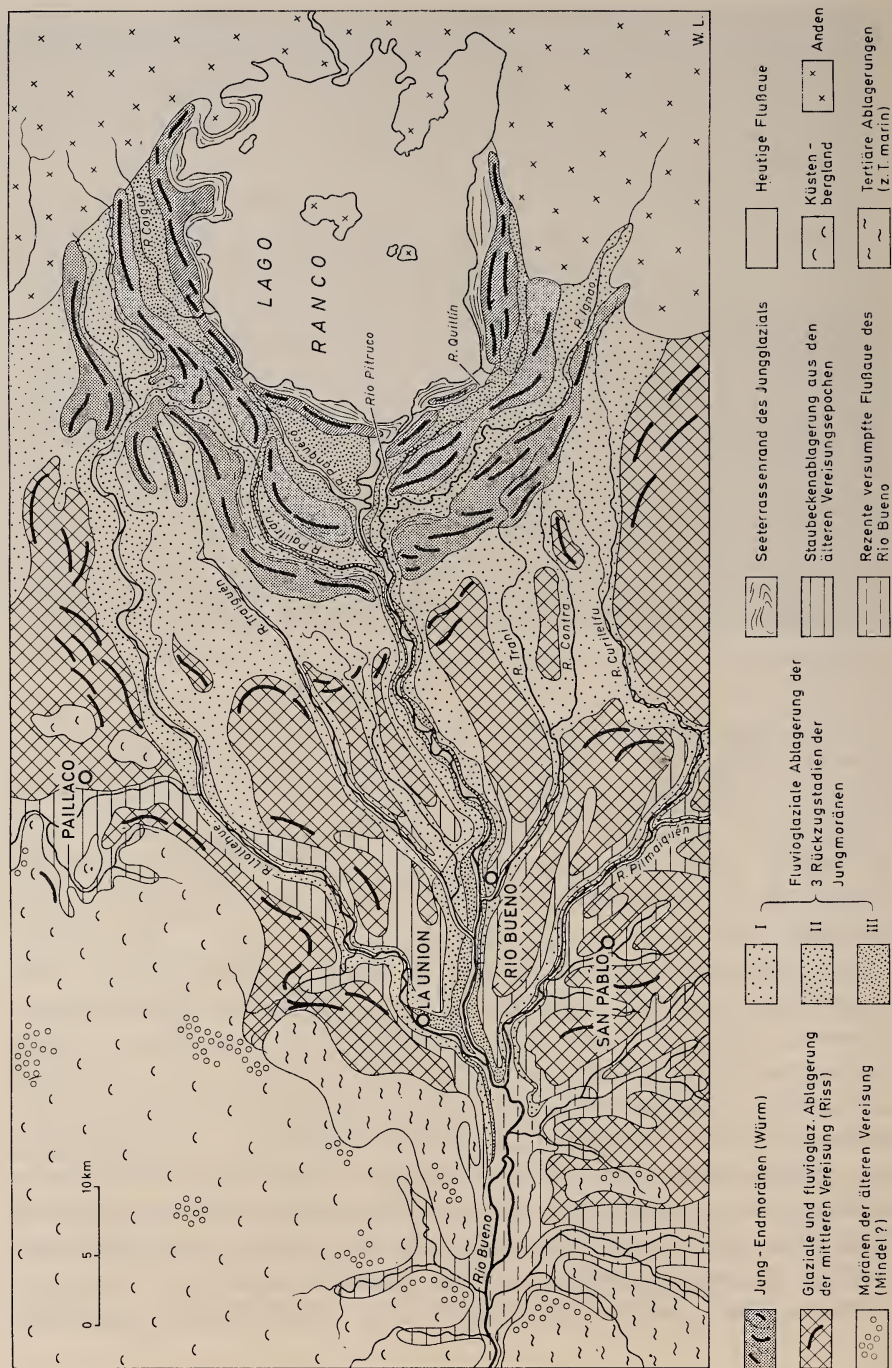


Fig. 3: Pleistozäne Ablagerungen am Ranco-See.



Fig. 4. Lago Ranco — Seestirn-Moräne mit Seeterrasse (auf zungenförmigem Vorsprung links und im Mittelgrund).

hohen Wasserspiegel nahm einst, gespeist aus einem sehr verzweigten Einzugsgebiet, einen mächtigen Eiskuchen auf. An seiner Stirn gruppieren sich in Staffeln wenigstens drei grosse Moränenwallgruppen. (Fig. 4 u. 5). Der Aufbau dieser Wälle ist sehr einheitlich. Das ungeschichtete, wirr durcheinanderliegende Material aus Sand, Kies, Geröll ungleicher Grösse und nur schwacher Kantenrundung ist häufig eingemischt in einen feinkörnigen, grauen bis gelblichen Tuff, der mittransportiert wurde. An einer Ablagerung als Moräne ist kaum zu zweifeln. Die fast unveränderten Blöcke und Blockpackungen bestehen aus Vulkaniten und Tiefengesteinen der Anden. An vielen Stellen sind Stauchungserscheinungen zu erkennen. Die Moränen zeigen kaum Verwitterungserscheinungen, sind aber überdeckt von einer braunen Tuffdecke von rd. $1/2$ —1 m Mächtigkeit, die im oberen Horizont leicht verwittert ist. Zwischen den einzelnen Moränenstaffeln verlaufen wallparallel kleinere und grössere Bäche, die fast rechtwinklig auf den Rio Bueno zufließen, der die Moränenlandschaft entwässert und zugleich dem Ranco-See als Abflussrinne dient. Die



Fig. 5. Wallmoräne der jüngsten Vereisung (am Ranco-See in der Gegend von Vivanco).

Bäche der äussersten Moränenstirn fliessen spitzwinklig auf den Rio Bueno zu (Fig. 3).

Zwischen den Wällen sind ausser fluvioglazialen Material auch Beckentone abgelagert, die als Reste alter Stauseestadien des Ranco-Sees gedeutet werden können. Zugleich zeigen Seeterrassen am heutigen Ranco-Ufer die verschiedenen postglazialen Stadien des Seespiegels an (Fig. 4).

Vor der äussersten Wallmoräne des Ranco-Sees breiten sich in westlicher Richtung schwach einfallende, meist gut geschichtete Schotterfelder aus (Fig. 3), nur hier und da von Grundmoränen aus älteren Vereisungsepochen unterbrochen. Sie gleichen im physiognomischen Bild den "schiefen Schotterebenen" des Alpenvorlandes in vieler Hinsicht. Dieser Formentyp mit spätglazialer Zerschneidung entspricht der trompetenförmigen Zertalung, wie sie von Troll 1926 im Alpenvorland beschrieben wurde (Fig. 6).

Man kann folgende Vorgänge beim Rückzug des Eises am Ranco-See rekonstruieren: Beim Höchststand der letzten Vereisung, bei dem die äussersten Moränenwälle aufgeschüttet und aufgestaucht wurden,

flossen die Schmelzwässer wohl an mehreren Stellen des Eisrandes ab. Alle Schmelzwasserrinnen strebten aber spitzwinklig der zentralen Entwässerungsrinne, dem Rio Bueno, zu, mit einer Ausnahme im Nordwesten des Sees (Fig. 3). Dort erreichte der äussere Moränenwall seine grösste Mächtigkeit mit Höhen über 300 m NN. Dies wird verständlich, wenn man eine Hauptstossrichtung des Eises von SSE nach NNW annimmt, die durch die Richtung des grössten eiserfüllten Tales aus den Anden vorgegeben wird. In diesem Bereich hat der Ranco-See-Gletscher eine grosse fluvioglaziale Schotterzunge aufgebaut, deren Ausläufer im Flusssystem des Rio Calle Calle enden, der in der Bucht von Corral mündet.

Aber schon in der beginnenden Rückzugsphase wurde der Weg nach Nordwesten blockiert, und alle Entwässerung geschah seitlich zur niedriger gelegenen Erosionsbasis des Rio Bueno-Systems. Die Hauptentwässerung aus der Nordflanke erfolgte durch den Rio Llollehue, der mit seinen Quellarmen heute in das Gebirge hineingreift (Fig. 3). Auf der Südflanke entwässerten die Quellflüsse des Rio Contra und Rio Curilelfu. Zentrale Entwässerungsrinne war jedoch der Rio Bueno selbst (Fig. 7).

Die Entwässerungsrinnen der zweiten Moränenstaffel sind ganz auf den Rio Bueno hin ausgerichtet. Als Hauptabfluss der Schmelzwässer diente für den Nordteil der Rio Llollehue, während der Rio Traiguén seine Verbindung zur Eiszunge verlor (Fig. 3). Für ihn entstand als neue Entwässerungsrinne auf der Nordflanke des Rio Bueno der Estero Palitrán, und von der Südflanke her führte der Rio Ignao die Schmelzwässer zum Rio Bueno.

Für die Entwässerung der dritten Hauptstaffel, die den See unmittelbar umgibt, sorgte auf der Nordseite der Rio Panqueco, der, wie die morphologischen Verhältnisse deutlich erkennen lassen, damals die gesamten Schmelzwässer der Nordflanke der Moränenstirn aufnahm und dem Rio Bueno zuführte. Er reichte mit seinen Quellarmen bis in das Gebirge und umfasste auch den Rio Coigue, der damals sein Quellfluss war. Heute ist er durch zweimalige Anzapfung vom See her in drei Teile zerlegt (Fig. 3). In einem früheren Stadium der dritten Wallmoräne könnten die Schmelzwässer nach den morphologischen Befunden noch den Estero Palitrán benutzt haben. Die Südflanke entwässerte der Rio Pitruco, der ebenfalls damals um die Bäche Quillin bzw. Chamel verlängert war. Auch hier fanden vom See aus Anzapfungen statt.

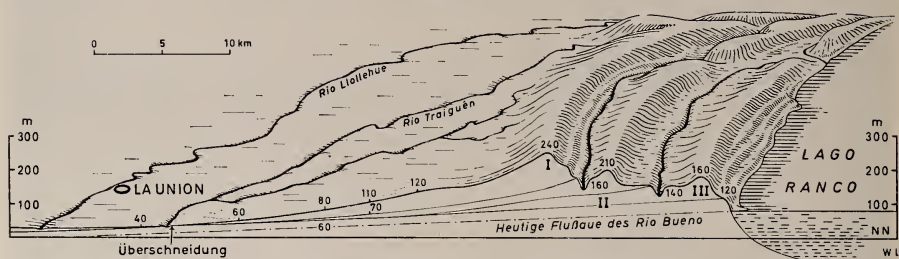
Die Niederterrassen des Ranco-Gletschers
(Schematisch)

Fig. 6. Schema der glazifluvialen Zertalung im Ranco-See-Gebiet.

Die genannten Beckentone innerhalb der Moränenstaffeln und zusätzliche morphologische Indizien deuten darauf, dass sich jeweils nach dem beginnenden Rückzug des Eises zunächst Stauseen bildeten, die dann schliesslich katastrophenartig abfließen und tiefe, schluchtartige Einschnitte hinterliessen. Zwischen der ersten und der zweiten Staffel sind drei Seeniveaus mit entsprechenden Ablagerungen zu erkennen. Man kann die einzelnen Rückzugsterrassen von den jeweiligen Moränen oder den Stauseeniveaus aus talab verfolgen (Fig. 6). Sie durchbrechen die älteren Moränen in tiefen Talschluchten. Im Mittellauf werden die Vertikalabstände der Terrassenniveaus immer geringer, bis die jüngeren schliesslich in das Niveau der älteren Terrassen einmünden und sogar kreuzen und ihre Schotter auf diesen ausbreiten.

ÄLTERE VEREISUNGEN

Die fluvioglazialen Schotterfelder der Jungmoränen sammeln sich in weiterer Entfernung von den Jungmoränen meist in grösseren Talzügen und ziehen als flussbegleitende Terrassen auch in die Durchbruchstäler des Küstenberglandes hinein, ehe sie unter den heutigen Flussauen verschwinden (Fig. 1 u. 3 u. Fig. 7). Im Längstal gehen die Schotterfelder häufig an einer verhältnismässig scharfen Grenze in ein mässig bewegtes Relief, das typische Längstalrelief über. Sanft gerundete Kuppen wechseln mit flachen Senken ab. Der kuppige Teil dieses Ablagerungskomplexes, vorwiegend von grauer und brauner Färbung, besteht zu einem hohen Prozentsatz aus vulkanischen Aschen und Tuffen, von sandiger, manchmal kiesiger Korngrösse (bis 4 mm), denen als Bindemittel tonig-mergeliges Material beigemischt ist. Die Ab-
 la-



Fig. 7. Niederterrassenfelder am Rio Bueno.

gerungen sind leicht verfestigt, so dass an Wegeeinschnitten sich senkrechte Wände bilden. Dazwischen finden sich zuweilen Gerölle und Blockpackungen in unregelmäßiger Anordnung (Fig. 8). Das Material ist oft sehr kräftig durchbewegt. Ein bräunlich-grauer Verwitterungslehm mit grobem Schotter begrenzt die Ablagerung im Hangenden. An geneigten Flächen sind solifluidale Bodenbewegungen und nicht selten Frostspalten zu erkennen. Die Annahme einer Grundmoräne liegt nahe. Die periglaziale Überformung spricht für eine ältere zeitliche Einstufung.

Diese kuppige Grundmoränenlandschaft ist durchsetzt von Endmoränenzügen, die sich oft in Staffeln anordnen (Fig. 3). Häufig schmiegen sie sich an die unteren Hänge des Küstenberglandes an, überziehen aber nie Höhen über 150 m NN. Die Geschiebe sind allgemein stärker verwittert als bei der Seestirnmoräne (Fig. 8). Der Grad der Verwitterung beschränkt sich allerdings auf eine Bleichung und zuweilen auf eine leichte Ferretisierung der äusseren Rindenzone. Manche Vulkangesteine, z.B. der Andesit, sind etwas stärker zersetzt. Lagen von Tuff sind eingemischt, und der Formenkomplex ist öfter leicht aufgestaucht.



Fig. 8. Moräne der vorletzten Vereisung.

Die zu diesen Moränen gehörigen Sanderablagerungen sind morphologisch noch erkennbar und lassen sich in Aufschlüssen nachweisen. Am Rio Bueno muss ein grosses Schmelzwasserbecken bestanden haben, das zeitweise kaum oder wenigstens sehr schlechten Abfluss gehabt haben muss (Fig. 3). Der genannte Formenkomplex hat eine klare Westgrenze (Fig. 1). Er gehört einer älteren Vereisungsperiode an, entsprechend der "Riss"-Vereisung im Alpenvorland.

Weitere Glazialablagerungen finden sich westlich dieser Grenze, vor allem in grösseren Höhen am Ostabfall des Küstenberglandes. In einer rötlich gefärbten Grundmasse sind mittelgrosse, bunte Gesteine in unregelmäßiger Anordnung aufgeschlossen, deren Verwitterungsgrad so intensiv ist, dass man sie fast ausnahmslos mit dem Messer zerschneiden und in der Hand völlig zerdrücken kann (Fig. 9). Auch hier sind Andesite vorherrschend. Das Bindemittel ist ein hochgradig zersetzter Tuff. Die darüber lagernde Verwitterungserde ist intensiv rostrot gefärbt.

Die beschriebenen Ablagerungen sind gleichfalls als Moränen zu deuten, da ihr Gesteinsaufbau klar die Herkunft aus den Anden erkennen lässt. Auch die unregelmässige Lagerung, die geringe Sortierung und



Fig. 9. Moräne der ältesten Vereisung.

das Vorkommen grosser erratischer Blöcke weist darauf hin. Die Fundpunkte dieser Ablagerungen, die zumeist noch unter dichtem Waldkleid verborgen liegen, erreichen Höhen von 400 m am Osthang des Küstenberglandes. Offenbar haben die Eisströme das Bergland aber an keiner Stelle völlig überwunden. Im Becken von Valdivia ist der äusserste Stand jedoch nahe an die Küste herangerückt.

Die zugehörigen fluvioglazialen Ablagerungen mit andinen Gesteinen konnten in verschiedenen Durchbruchstätern des Küstenberglandes gefunden werden, deren Quellgebiet heute nicht mehr bis zu den Anden reicht. Die Endmoränen dieser Vereisungsperiode haben die Talzüge des Küstenberglandes häufig zementiert. Dies hatte weiterhin zur Folge, dass das Material der jüngeren Vereisungsperioden sich zunächst in grössern Schmelzwasserstaubecken am Ostfuss des Küstenberglandes ablagerte, ehe sich das Wasser einen neuen Abfluss bahnen konnte. Mehrere alte Abflussrinnen blieben aber blockiert und haben heute ein viel zu breites Tal im Verhältnis zu dem kleinen sie durchfliessenden Bach (Fig. 1 z.B. Rio Lingue, Rio Contaco, Rio Chaihuin).

Die beiden beschriebenen älteren Moränenkomplexe lassen sich vor allem durch die *Art der Verwitterung* und *Bodenbildung* sehr klar

trennen. Der jüngere Moränenkomplex ist gelblich-braun verwittert (Trumaoboden), der ältere hingegen intensiv rötlich (*Red Volcanic Clay*, Wright 1964). Die roten Böden reagieren sauer und sind geringwertig für die Landwirtschaft, der Trumaoboden dagegen gilt als der beste landwirtschaftliche Boden der Zone. Wright (1964) konnte an Hand von Tonmineralanalysen nachweisen, dass die roten Böden unter anderen Bedingungen entstanden und älter sind. Meine gezielt entnommenen Bodenproben ergaben keinen so klaren Befund, der zu der zeitlichen Einstufung der drei Formenkomplexe zu drei verschiedenen Eiszeitperioden Hinweise geben könnte.¹ Die »Red Volcanic Clays« (Wright) des ältesten Moränenkomplexes (sowohl in der stark verwitterten Moräne als auch in aufliegenden äolisch oder fluvioglazial abgelagerten Tuff-Böden) enthalten als Tonmineral vorwiegend *Halloysit*. Die Bodenbildung fand vermutlich in einem der alten warmen Interglazial statt (Mindel/Riss). Die gleichfalls aus vulkanischen Aschen bestehenden älteren Trumaoböden über den Glazialablagerungen der vorletzten Vereisung enthalten ebenfalls *Halloysit*. Kaolinit wurde nicht gefunden. Die Böden der Seestirnmoränen einschließlich der fluvioglazialen Schotterkegel (auch die Ñadis und die jüngeren Trumaos) führen fast nur *Allophan* als Tonmineral. Die Bodenproben zeigen nach der allgemeinen Auffassung über die Entstehung der Tonminerale in vulkanischen Aschenböden eine klare Entwicklungsreihe von den jungen allophanreichen Bodenkomplexen zu den älteren mit vorherrschendem *Halloysit* als Haupttonmineralbestandteil.

Es lassen sich also mehrere Indizien beibringen, die eine Folge von drei Eiszeitepochen wahrscheinlich machen. Hierfür ergeben sich nach den Geländebefunden folgende Kriterien:

1. Der Verwitterungsgrad der einzelnen Moränenkomplexe ist sehr deutlich unterschieden.
2. Die Tonmineralbildung zeigt eine klare relative Altersstellung.
3. Die morphologische Gestalt der einzelnen Ablagerungen ist gut differenziert, frische Formen an der Seestirn, reife Formen im Längstal, greisenhafte Formen im ältesten Ablagerungskomplex.

¹ Ich danke an dieser Stelle dem chilenischen Bodenkundler E. Besoain, der mir die Tonmineralanalysen durchgeführt hat. Die Ergebnisse der Proben werden an anderer Stelle in einer speziellen Abhandlung veröffentlicht.

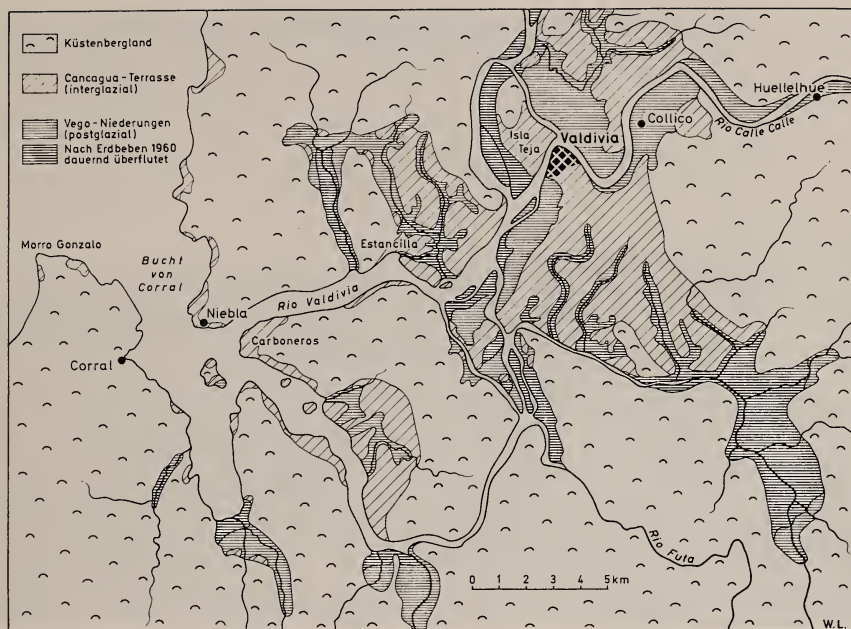


Fig. 10. Interglaziale und postglaziale Terrassen im Becken von Valdivia.

4. Solifluktsdecken fehlen an den Seestirnmoränen. Sie treten in den älteren Ablagerungsbereichen häufig auf.

5. Die auflagernden Tuffdecken und die dazwischengeschalteten Verwitterungshorizonte häufen sich nach den älteren Ablagerungskomplexen hin.

Eine endgültige Feststellung verschiedener Vereisungsepochen kann aber nur durch den Nachweis von *Interglazialen* geschehen. Wenn man die Ergebnisse von Auer aus Ostpatagonien heranzieht, so sind die mächtigen Tuffdecken über und zwischen den älteren und jüngeren Moränen als interglaziale Ablagerungen zu werten, da Auer jeweils im Interglazial verstärkten Vulkanismus nachweisen konnte. Doch fehlt bislang eine eindeutige Koordinierung mit seinen Studien. Nur die eine Tuffdecke auf den Stirnmoränen stimmt nach der Art der Ablagerung und dem Mineralbestand des Tuffes mit der spätglazialen O-Eruptionsschicht Auers in Ostpatagonien überein. Auch die häufig auftretenden Bodenhorizonte können z.T. als interglaziale Bildungen ange-



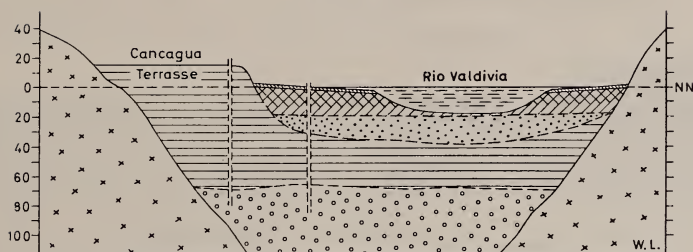
Fig. 11. Bucht von Corral — im Mittelgrund Cancaguaterasse (interglazial).

sehen werden. Andererseits lassen sich in den Staubecken und anderen Senken pflanzenführende, feinsandige bis tonige Sedimente einer Gytia und auch Faulschlamme finden, die auf warmzeitliche Interglaziale schliessen lassen; doch ist eine klare Feststellung der Ablagerungsfolge mangels geeigneter Aufschlüsse und fehlender Pollenanalyse bislang nicht vorzunehmen gewesen.

Allein die morphologischen Verhältnisse der Bucht von Valdivia (Fig. 10 u. 11), in der sich glazifluviale und interglaziale Meeresablagerungen verzahnen, geben wichtigen Aufschluss und Hinweise über die zeitliche Abfolge, zumindest des jüngeren Pleistozäns.

Das Küstenbergland um Valdivia ist gekennzeichnet durch ein tief eingeschnittenes weit verzweigtes Talsystem, in das das Meer zu verschiedenen Zeiten »ingrediert« hat. Bis weit über die Stadt Valdivia hinaus ist z.B. heute der Gezeitenhub von annähernd 2 Metern wirksam. Das Salzwasser drang in einer Unterströmung bis kurz vor Valdivia und dringt seit dem Erdbeben von 1960 weitere 10 km landeinwärts. Fast alle Flussverzweigungen des ertrunkenen Talsystems um Valdivia werden von einem auffallenden Terrassenniveau begleitet (Fig. 10 u. 12).

Querschnitt durch die quartäre Beckenfüllung des Rio Valdivia
(bei Valdivia)



Längsprofil durch das Flußmündungsgebiet des Rio Valdivia

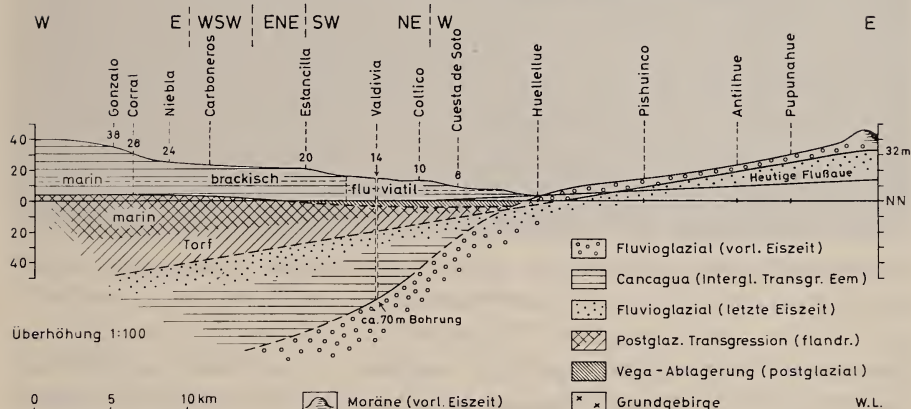


Fig. 12. Längs- und Querprofil durch die pleistozäne Sedimentationsfolge im Gebiet von Valdivia.

Das Niveau hat an der Aussenbucht von Corral eine Höhe von etwa 40 m NN, setzt sich in der Bucht unter ständiger Verminderung der Oberkante fort, um bei Huellalhue, etwa 20 km von der Küste, im Flussniveau auszuklingen. In der Höhe von Valdivia beträgt die mittlere Höhe rd. 15 m NN. Das Niveau wird allgemein als Cancagua-Terrasse bezeichnet. Cancagua bedeutet in der Mapuche-Sprache einen Boden, den man zur Herstellung von Backöfen benutzen kann. Die Terrasse besteht in ihren über NN hinausragenden Teilen im wesentlichen aus einem umgelagerten verkitteten Tuff mit verschiedenen Beimengungen. In Meeresnähe sind marine Horizonte eingeschaltet, gut erkennbar an dicken Muschelpflastern. Nicht selten sind Treibhölzer und Pflanzenreste untermischt und hier und da Geröllhorizonte zu

sehen. Das Tuffmaterial stammt aus dem Andengebiet, das in der Bucht unter dem rückstauenden Einfluss des Meeres in einer breiten Terrasse abgelagert ist. Am Aussenrand der Küste geht sie in eine marine Abrasionsfläche über.

Die aufschlussreichste Tatsache für die Datierung der Eiszeiten ist darin zu sehen, dass die Cancagua-Terrasse von Schmelzwassersanden und -kiesen unter- bzw. überlagert wird. Die unterlagernden Schotter tauchen in der Höhe von Huelleshue im Tal des Rio Calle Calle unter der Cancagua-Terrasse heraus und führen als Schotterzunge an die Wallmoräne der vorletzten Vereisung heran (Fig. 12). Bei Valdivia beginnen die gleichen Schotter in einer Tiefe von ca. 70 Metern direkt unter den Ablagerungen der Cancagua-Terrasse, die dort mit grauem Schluff, Faulschlamm und mit Treibholz und Pflanzenresten beginnt, wie Bohrungen zur Wasserversorgung von Valdivia 1957 an zwei Stellen ergeben haben. Die Cancagua-Ablagerungen setzen sich dann bis zum oben beschriebenen Niveau von 15 Metern über dem heutigen Meeresspiegel, allmählich in die genannten Tuffablagerungen übergehend, fort.

Da andererseits die Erosionstäler der jüngsten Vereisung in die Cancagua-Terrasse eingetieft — zeitlich also jünger — sind und deren Schotterterrassen bis zu den Seestirnmoränen hinführen, kann man zeitlich für die Entstehung der Cancagua-Terrasse eine letztinterglaziale Meerestransgression verantwortlich machen. Die Höhe der Terasse (im Mittel 20 m) stimmt überdies mit der allgemeinen Höhe des Meeresspiegels im letzten Interglazial (*Eem-Meer*, *Monastir*) gut überein. Die Höhenunterschiede der Terrasse zwischen der Aussenküste und dem Becken können als tektonische Verstellungen seit dieser Zeit gedeutet werden (Illies 1960 u. 1967). Das letzte Erdbeben hat diese Deutung bestätigt, die besagt, dass Küstenkordillere und Längstal einer eindeutigen Kippbewegung unterliegen (Illies 1960 u. 1967).

Ausser der letztinterglazialen Meerestransgression ist auch der nach-eiszeitliche Höchststand des Meeres in der Bucht von Valdivia gut zu erfassen. Er ist als marine Terrasse oder Hohlkehle an der Aussenküste in ca. 2 Meter, in der Bucht von Corral in 1—2 Meter über dem mittleren Hochwasser ausgebildet. Die Salzwasserablagerungen der postglazialen Meerestransgression liegen seit dem Erdbeben 1960 in 2 bis 4 Meter unter dem heutigen Wasserspiegel. Sie sind von holozänen Feinsedimenten überdeckt und bilden die Vegas. Diese ragten bis 1960 bis zu 1,5 Meter über NN aus dem Wasser. Seit dem Erdbeben steht



Fig. 13. Vega südlich Valdivia — seit dem Erdbeben von 1960 ständig überschwemmt.

das mittlere Hochwasser in Höhe der Vegas (Fig. 13). Sie werden bei Flut überspült. Die etwas tiefer liegenden Teile der Vegas bleiben auch bei Ebbe unter Wasser. Die Schrägstellung der beiden Transgressionsterrassen dürften tektonische Ursachen haben, wie auch das Erdbeben von 1960 zeigte (Illies 1960 u. 1967).

Bohrungen haben ergeben, dass über den jungeszeitlichen Schottern in der Bucht von Valdivia ein Bruchwaldtorf mit Hölzern einsetzt, darüber liegen Sande, Kiese und Schluffe mit Einschluss mariner Muscheln. Die im Liegenden vorhandenen Sande und Kiese der jüngsten Vereisung, die 10 km oberhalb von Valdivia unter dem Flussniveau auftauchen und an die jungglazialen Sanderflächen der Seestirnmoräne heranführen, zeigen ihr relatives Alter. Sicher wird man das Niveau der *postglazialen, flandrischen Transgression* hierbei erfasst haben.

Natürlich kann nichts Eindeutiges über die absolute Datierung ausgesagt werden. Es unterliegt aber wohl kaum einem Zweifel, dass eine Abfolge von Kaltzeiten mit Lieferung von andinem Material aus den Gletschern und warmzeitlichen marinen Transgressionen vorliegt,

die den Vorgängen aus anderen Gebieten der Erde entsprechen. Die Steilheit übrigens, mit der die eiszeitlichen Schotterstränge von den Andengletschern in der Bucht von Valdivia in den offenbar tiefen, submarinen Cañon des Valdiviaflusses abtauchen, sprechen sehr dafür, dass die Zeit ihrer Ablagerung mit der eiszeitlichen Meeresspiegelabsenkung von rd. 100 m korrespondiert (Die Oberkante der älteren Schotter senkt sich auf 6 km um 65 m ab!). Der submarine Cañon des Valdivia-Flusses ist auf Seekarten deutlich zu sehen.

Mit diesem Beispiel der Verzahnung von fluvioglazialen Schottersträngen und eustatischen Meeresterrassen scheint zumindest eine relative Abfolge der beiden letzten Vereisungsepochen gesichert.

ZUSAMMENFASSUNG

Das südchilenische Seengebiet wurde morphologisch massgeblich durch die quartären Vereisungen mitgestaltet. Der jungglaziale Formenschatz trägt frische Züge. Er dürfte der glazialen Serie der jüngsten Vereisung (Würm) in Europa, besonders der des Alpenvorlandes voll entsprechen.

Ablagerungen älterer Vereisungen sind in Südkile gleichfalls nachzuweisen, doch ist die zeitliche Gliederung und die Anzahl der Vereisungen schwer zu ermitteln. Mit einer gewissen Sicherheit kann man drei Vereisungsepochen aufgrund morphologischer und bodenkundlicher Indizien feststellen. An der Küste und in der Bucht von Valdivia sind glazial-eustatische Terrassen zu erkennen. Ihre Verzahnung mit glazifluvialen Terrassen ergibt folgenden Ablauf: 1. vorletzte Eiszeit (Riss?) mit niedrigem Meeresspiegelstand und Schmelzwasserablagerungen, 2. interglaziale Meerestransgression (Eem) mit Ablagerung der Cancagua-Terrasse, 3. letzte Glazialzeit (Würm?) mit erneuter Meeresspiegelabsenkung und Ablagerung von Schmelzwassersanden, 4. postglaziale Meerestransgression (einschliesslich Vegabildung).

Der Nachweis älterer Vereisungen wird im chilenischen Längstal deshalb schwierig, weil die während des ganzen Quartärs bis heute lebhafteste Tektonik viele Zusammenhänge verwischt hat und Deutungen erschwert. Wie bei Bohrungen der Erdölgesellschaft (ENAP) sich zeigte, ist das südchilenische Längstal sehr unterschiedlich von glazialen Sedimenten erfüllt mit mittleren Bedeckungsmächtigkeiten zwischen 300 und 1200 m. Hieraus lässt sich auf ein bewegtes Relief zu Beginn der quartären Kaltzeiten und starke tektonische Bewegungen schliessen,

die bis heute andauern (Illies 1960 u. 1967). Dagegen kann die lebhaft vulkanische Tätigkeit während des gesamten Quartärs nach genaueren Studien wie z. B. in Ostpatagonien zur weiteren Aufhellung des glazialen Geschehens während des Quartärs in Südchile beitragen; doch fehlen hierzu noch die einschlägigen Untersuchungen, wie sie auf der ostpatagonischen Seite durch Auer und seine Arbeitsteams durchgeführt wurden.

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SOME MODELS IN MARKETING GEOGRAPHY WITH SPECIAL REFERENCE TO PROBABILITY SURFACES

by

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Most — if not all — of the processes which interests
a social scientist are of a probabilistic nature.

HÄGERSTRAND

I. THE PROPERTIES OF BIAH-MODELS IN MARKETING GEOGRAPHY

Baumol & Ide, Applebaum, and Huff have made valuable contributions to marketing geography. When writing this paper we are glad to give credit to these four scholars. Although our ideas emerge mainly from the Baumol and Ide investigation we take the opportunity to use the term BIAH, which stands for Baumol-Ide-Applebaum-Huff.

1. The shop-customers efforts

A customer entering a shop has to perform, from the point of view of profit maximization, certain efforts which ought to be mea-

* The paper is divided into two parts. Although we have discussed everything gently in common let it still be said that the authors' responsibility is divided as follows. Mr. Lindstahl is the author of the conceptual part I, whereas Mr. Johans is responsible for part II which deals with urban forecasting problems.

L.C.J. S.E.L.

sured both in money and energy units. Since the quantification of the latter goes beyond the reach of a social science researcher, the cost-aspect becomes vital. Baumol and Ide (1956) introduce three types of costs viz.

$c_d D$ = Distance cost (e.g. home \rightarrow shop) where c_d is a constant and D stays for distance.

$c_n \sqrt{N}$ = A cost that we prefer to call "strolling around in the shop" cost. N stands for the number of items stocked.

c_i = A cost not varying with either distance (D) or variety (N). This emerges e.g. from planning the trip (initiative) and includes opportunity costs as well.

The sum of shopping costs to the customer, E , is thus by definition

$$E = c_d D + c_n \sqrt{N} + c_i \quad (1)$$

However, when planning a shopping trip the customer, implicitly or explicitly, thinks in terms of net gain or net benefit. The gain is a function of a satisfied shopping result (goods purchased). In advance, however, the probability (p) of maximum satisfaction is seldom 1, but

$$0 \leq p \leq 1 \quad (2)$$

Let, according to Baumol & Ide, N be the number of different items or number of varieties sold by the retailer, and $p(N)$ the probability of specific satisfaction regarding item i . Then we may write

$$0 \leq p(N) \leq 1 \quad (3)$$

A larger N increases $p(N)$. Thus

$$\frac{\partial p}{\partial N} \geq 0 \quad (4)$$

Let $f(N, D)$ denote customer's net benefit. The customer is expected to judge the value of both $p(N)$ and E . More formally positive weights, w and v , are attached to these variables. According to Baumol and Ide the customer will not shop at a store unless for him

$$f(N, D) = w \cdot p(N) - v \cdot E \quad (5)$$

is positive.

Baumol & Ide (1956) discuss in detail (p. 95) the economic implications of model (5).

2. The maximum sales radius

Considering again model (1) where $E = c_d D + c_n \sqrt{N} + c_i$ the above mentioned authors implicitly introduce a iso-line reasoning. Explicitly, however, they define the maximum shopping distance which offers the consumer zero net benefit. By inserting $f(N, D) = 0$ and solving for D they get

$$D_{\max} = \frac{w}{v c_d} p(N) - \frac{1}{c_d} (c_n \sqrt{N} + c_i) \quad (6)$$

If we substitute Φ for $\left[\frac{w}{v c_d} p(N) \right]$ and

$$\Theta \text{ for } \left[\frac{1}{c_d} (c_n \sqrt{N} + c_i) \right]$$

the hinterland's area reaches its maximum under the following condition.

$$D_{\max} = \Phi - \Theta \quad (7)$$

which of course is a simplified version of (6).

However, we emphasize that a big D_{\max} is dependent on a great value of Φ when Θ is fixed or, a small value of Θ when Φ is fixed. Great(er) values of D_{\max} can be obtained by trying to optimize e.g. the kilometre travel cost, c_d . but since $c_d \in \Phi$ and $c_d \in \Theta$, the solution will be very complex with varying values for the remaining parameters Φ and Θ . Although the v 's are individual values corresponding to separate human beings, one might presume to suppose that the v 's standing for aggregates are a function of social attitudes and standard of living. Thus lower v -values are expected in wealthy-people strata, and higher v 's in poor-people strata. The w -values depend on education, information, awareness, and taste. (A maximum w -value may be achieved if, for instance, perfect knowledge of assortment is obtained by a telephone call in advance before the shopping trip.) Let w var. $0 \rightleftharpoons 1$ and v var. $0 \rightleftharpoons 1$. Then, in a favorable case from the point of view of the shop:

$$\begin{aligned} (w = 1: p(N) = 0.99: v = 0.1: c_d = 1) \\ \Phi = \frac{1.0 \cdot 0.99}{0.1 \cdot 1.0} = 9.9 \text{ distance units} \end{aligned} \quad (8)$$

And in an unfavorable case: ($w = 0.5: p(N) = 0.4: v = 0.9: c_d = 1$)

$$\Phi = \frac{0.5 \cdot 0.4}{0.9 \cdot 1.0} = 0.222 \text{ distance units} \quad (9)$$

3. Some examples of how sales radius may be altered

It stems from the above discussion that it is favorable for the shop to act in a direction towards minimizing Θ . As stated before,

$$\Theta = \frac{c_n \sqrt{N} + c_i}{c_d}.$$

Then, if c_d depends on autonomous circumstances, which cannot be changed in the short run,¹ a lower Θ proposes a minimum for $c_n \sqrt{N} + c_i$. Baumol & Ide discuss lucidly how $c_n \sqrt{N}$ can be put sufficiently low. How then to manage to keep c_i at a reasonable level? This is not easy to answer since c_i also depends, among other things on travel time. By inserting 1 for c_d , 1 for $c_n \sqrt{N}$ and 1 for c_i we, as an illustration, get:

$$\Theta = \frac{1+1}{1} = 2 \quad (10)$$

$\Theta = 2$ from equation (10) in case (8) yields $D_{\max} = 7.9$ distance units whereas in case (9) a negative value for D_{\max} is obtained.

4. A brief statement of the buying-power surface

In the real world, however, no estimations of customer potentials can be performed unless we are able to quantify the *spatial* array of customers. Since Baumol & Ide are not professional geographers, and because the demand functions stay in the foreground, they pay small attention to the spatial approach.² They, however consider two cases

case i. Population per equare mile is given by the constant K . Within an area with radius D_a the population then becomes

$$K\pi D_a^2. \quad (11)$$

case ii. The store is centered at the point of greatest population density, K_{\max} , and the density varies inversely with distance from the shop. The population within the circular area of radius D_a is given by

¹ Cf. the statement that when $c_d \in \Phi$ a change in c_d leads to a doubtful effect. However, it is favorable to act so that the customers have a feeling of possessing a very low value of v , see model (8).

² The spatial approach is stressed by Applebaum et al.

$$\int_0^{\pi D_a^2} \frac{K}{D} d \cdot \text{area} = \int_0^{D_a} \frac{K}{D} 2\pi D dD = 2\pi K D_a \quad (12)$$

Our own notation for sales (B_r) for the sake of brevity in case (12) is then

$$B_r = \emptyset \cdot 2\pi K D_a \quad (13)$$

where \emptyset stands for average household expenditure in finnmaks per time period.

5. The retailers profit

Let us put the retailers costs for the same time period as C_r . Then we get the net profit P_r by

$$P_r = B_r - C_r \quad (14)$$

Let us then make the following brief remarks

- (i) A spatial solution for estimating B_r in the context of both a nonstochastic and a stochastic population (e.g. buying power) surface has been under investigation by some scholars. For example, Baumol & Ide deal with formal calculations emerging from (11) and (12). Applebaum stresses *empirical* surveys by the tools of Marketing Geography. Huff makes use of the probability concept. Huff's main idea can be described by the following model

$$E(A_{ij}) = \frac{\frac{S_j}{T_{ij}^\lambda}}{n} \cdot C_i \cdot B_{ik} \quad (\text{For all } i's) \quad (15)$$

$$\sum_{j=1}^n \frac{S_j}{T_{ij}^\lambda}$$

where

$E(A_{ij})$ = the expected annual sales potential for shopping center j with respect to a given product class from each of the i^{th} statistical units.

B_{ik} = the annual amount budgeted by consumers in the i^{th} statistical unit for product class k ,

- C_i = the number of consumers in the i^{th} statistical unit,
 S_j = the square footage of selling space devoted to the sale of a particular class of goods by shopping center j ,
 T_{ii} = the travel time involved in getting from a consumer's travel base i to shopping center j , and
 λ = a parameter which is to be estimated empirically to reflect the effect of travel time on various kinds of shopping trips.

- (ii) The total costs C_r , consist of a group of costs among which, according to our opinion the ware-housing *space cost*, i.e., the shop's rent (C_R), varies most dramatically with location. If we then manage to contribute towards a better understanding of C_R (where $C_R \in C_r$), this, in addition with reasonable estimations of B_r , would contribute to a better understanding of P_r . We then sooner or later, it is hoped, try to lighten the "Geography of Retailing Profitability".

However, the sequences which follow are not as far reaching yet but devoted to the following questions

1. The properties of C_R -surfaces, i.e. the geography of the rent level.
2. Location probability field-analysis with special reference to forecasting.

6. Properties of rent surfaces

Simple density functions ignoring spatial directions. Consider a rent gradient in fig (1 a) where the observations are plotted on the scales according to monthly square metre rents $\emptyset R$ and distance (D) from the city's hard core, i.e. the point of gravity of CBD.

By the methods of least squares the gradient can be calculated. The coefficient of determination, among other measures, expresses the power. In terms of stochastic reasoning the gradient can be transformed into a probability density function with regard to an interval $a \rightarrow d$ if the distance $d \rightarrow b$ is expected to be of uncertain kind. Then we get the following illustration, fig. (1 b)

where the shaded area is expressed by

$$\int_a^d f(x) dx = 1 \quad (16)$$

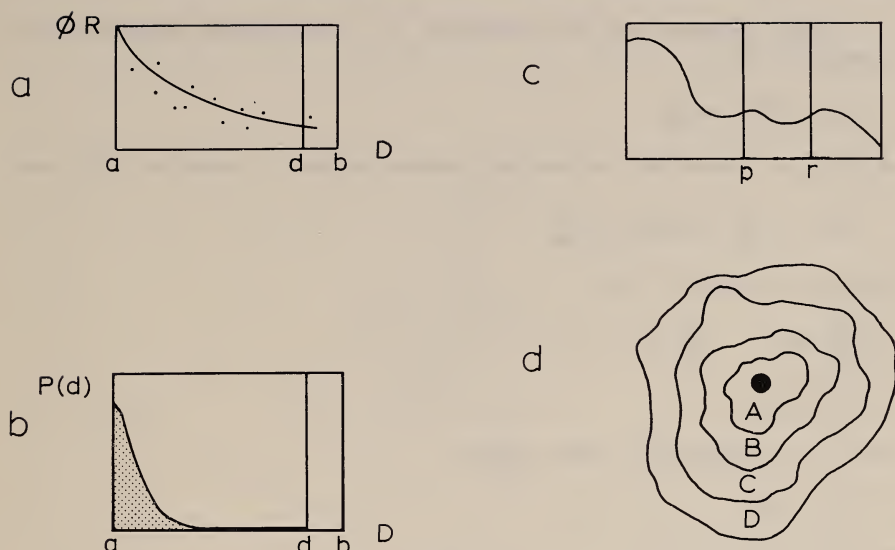


Fig. 1.

Technically the transformation stems from the fact that the highest rent quotation (a) in fig (1) is defined as a maximum probability point that is to say, we ask the following question along the line a—d: what is the probability $P\{d\}$ that we have to pay the price a? Thus, the density function is based on empirical figures according to the spread of regression in fig. (1 a). Especially regarding situations where multi-centers are occurring, the density function may be more complex than outlined in fig. 1 b since the saddle points of the original R-gradient are influencing the density function. To use an example on fig. 1 a & b:

Location	Zero ¹	1	2	3	4	5	6	7	8
$P\{d\}$	0.80	0.03	0.02	0.04	0.07	0.01	0.01	0.01	0.01

The fitting of $P\{d\}$ into a mathematical formula may well lead to sin or cosin-functions.

In many cases, specially regarding demographic phenomenon (cf. Ajo) the original observation function already takes the shape of sinus-curves.²

¹ zero = point of gravity.

² Cf. Fig. 1 c.

A small example may be worthwhile. If a demographic gradient can be expressed by e.g.

$$f(x) = 0.028 \sin \frac{x}{50}$$

we may ask where the demographic function obtains a maximum. We have:

$$f'(x) = \left(\frac{1}{50} \right) (0.028) \cos \frac{x}{50}$$

Setting the derivative = zero

$$\frac{0.028}{50} \cos \frac{x}{50} = 0$$

$$\cos \frac{x}{50} = 0$$

Since zero is expressed by 1.5708 radians

$$\frac{x}{50} = 1.5708$$

we get

$$x = 78.54$$

By trial f'' is negative, so $f(78.54)$ must be a maximum. In cases of retailing shop rents too, sin-curves have certain properties. If empirical rent gradients follow the shape expressed in between intervals like $p \rightarrow r$ in fig. 1c the sin-fitting is at least worth trying.

Numerical rent observations taking into account spatial aspects. Operational difficulties arise when the gradients illustrated above are used in an actual empirical context. Consider the situation as presented in fig. 2. The bars measure the square metre rents for a sample of specialty stores. The highest bars are of stores associated with the inner parts of the CBD, within what Rannels refers to as the "hard core".¹ All bars are associated with the CBD with the exception of nine that are outside the CBD. These T-type bars comprise a sub centre.

The information presented in three dimension in figure 2 can be presented in several types of two dimensional illustrations with varying degrees of complexity. One alternative would be to present the rent intensity as a function of distance from the centre of gravity (CG). Difficulties will arise in the determination of the CG. Furthermore, we must face the added problem of how to handle direction

¹ Rannels 1956.

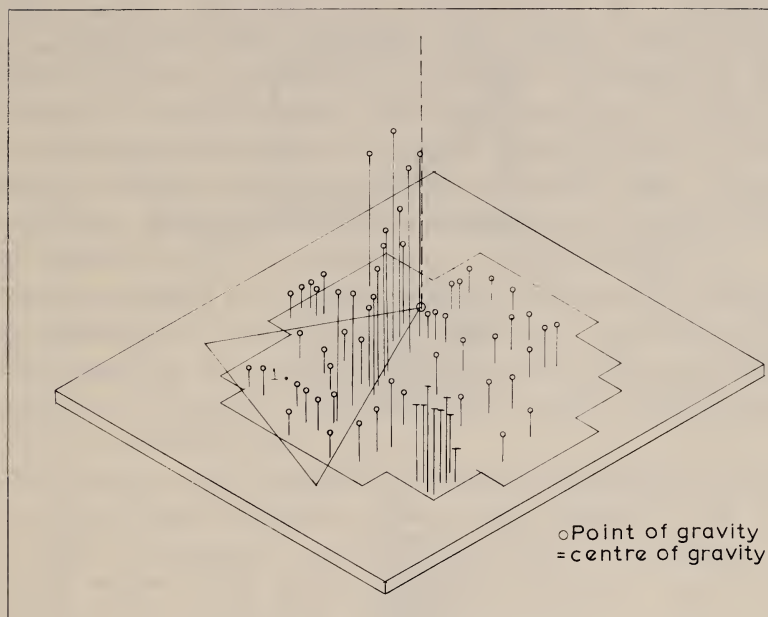


Fig. 2.

and aggregation. In other words, shall we only interpret one set of observations; for example only those in the corridor (strictly speaking a circle sector) labeled No. I in figure 3 b.

Seventeen observations are plotted in figure 3 a. Following the product moment correlation technique we can easily calculate the regression gradient. This can be observed in graphic form in fig. 3 a. We proceed from this to the calculation of the gradients for sectors Nos. II, III, etc., until the sum of the sectors' areas cover 360° . In detail the system is as follows:

- (1) The number of sectors (n) is chosen so that $\frac{360^\circ}{n}$ is an integer.
- (2) One side of the sector (which is associated with an isosceles triangle) is identical with a linear distance running from the CG due north (direction 0°).

The illustration fig. 3 b presents a system with eight sectors. If the tentative CBD belongs to a town located in such a manner that the socio-economic environment is spread out in all potential directions (angles from CG) the treatment of the sector characteristics

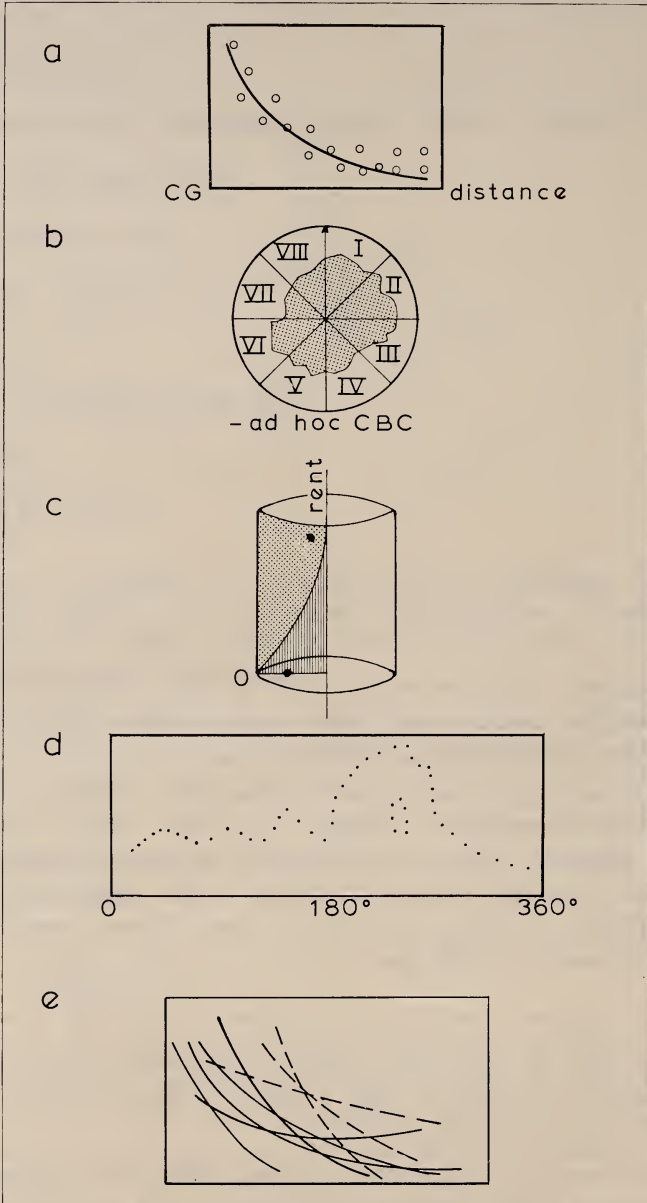


Fig. 3.

is highly varied. From this we can proceed to the construction of what we prefer to call a dot-sheet. By rotation (see fig. 3 c) the complete dot-path is projected on a dot-sheet symbolized by fig. 3 d. The structure of this dot-sheet (the spatial formation of points) then can be statistically described by means of specific cluster or clumping techniques (derived from Barlett, 1960 and Roach, 1968). Otherwise, the traditional statistical description consists of one gradient for each of the sectors in fig. 3 b, resulting in a graph like fig. 3 e.

Generally we suggest e.g. multiple regression analysis for measurement of the geography of shop-rent level. However, the cause and effect problem regarding the rational of rent formation does not explicitly interest us at this time. Those interested in this technique may be referred to Lindst hl (1968).

It may be finally worth mentioning that we are concluding experiments with a more complex plotting technique than outlined in fig. 3. The town under investigation is zoned according to isochrones. The hard core centre is by definition the mid point for zone A which is delimited by a five-minute pedestrian isochrone, see fig. 1 d.

Proceeding further it is thus possible to construct a dot sheet like fig. 3 d which accounts for separate dot formations representing respectively the zones A, B, C, and D.

II. CAN BIAH TYPE OF MODELS BE USED FOR FORECASTING

1. Social and economic structure

At a given time there is a spatial distribution of the social activity. That is, we have a given infrastructure; shops, mills and population have localized to given points.

This structure, S , can be considered continuous, but for empirical work the geographic space is divided by a grid into squares. Each square is identified by its coordinates, (indices) i, j . The given social and economic structure is defined as the set of the matrices M_k ($n \times m$) that define the intensity (an element of M_k) and the location (the indices, i, j) of each social and economic activity. Thus,

$$S = (M_k \quad k = 1, 2, 3, \dots) \quad (1)$$

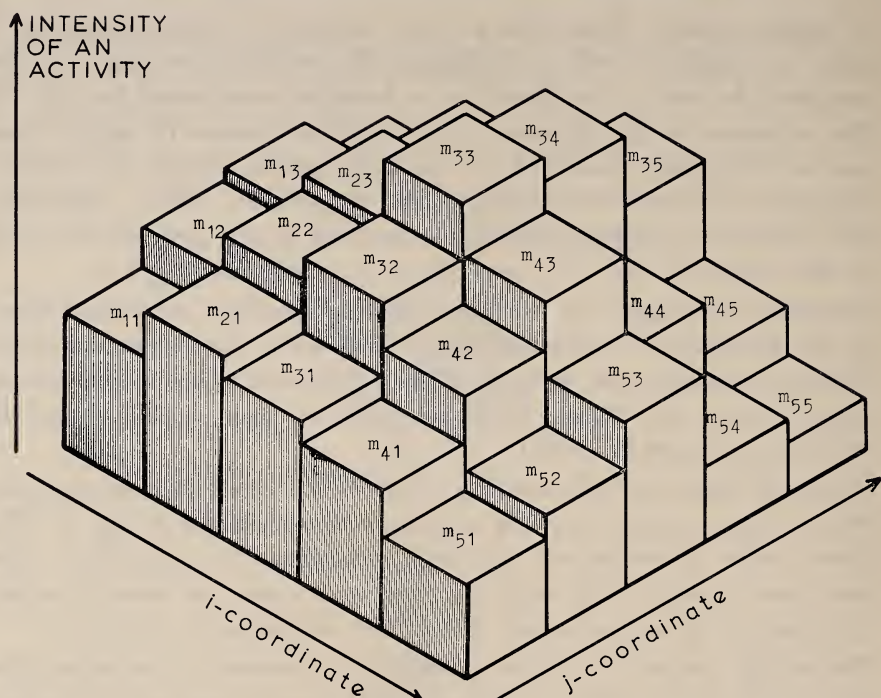


Fig. 4.

2. Location of activities

An activity has chosen a specific location mostly because the benefit of the location has exceeded the cost of it. Thus historical facts have determined the location. Later changes in the structure may force an activity to relocate because the cost of the location exceeds the benefit of it. To be normalistic we say that the benefit $[B(n \times m)]$ of a given location is a function of the social structure.

$$B = f(S) \quad (2)$$

E.g. a retailer is dependent of his customers. If the population structure is such that there are many people living in the neighbourhood, the benefit may exceed the cost of that location.

Likewise we say that the cost $[C(n \times m)]$ of a given location is a function of the social structure.

$$C = g(S) \quad (3)$$

The net benefit [$B_N(n \times m)$] of a location is thus,

$$B_N = B - C \quad (4)$$

3. Forecasting urban development

In urban theory the stress has been on the urban structure, and not so much on the future urban development. The concept, net benefit of a location makes possible primitive forecasting of urban development. If an element of B_N , $b_{Nij} < 0$ it may be profitable for the activity to relocate. If an element of B_N , $b_{Nij} > 0$ it is profitable to remain at a given location i,j . When b_{ij} is very big new activities may find it profitable to enter into the area. Thus,

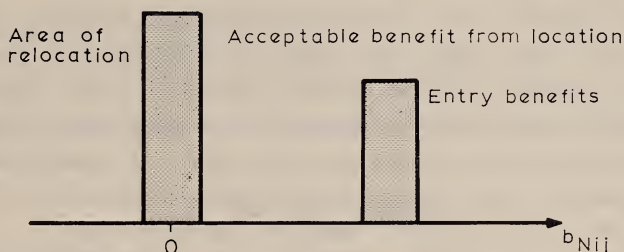


Fig. 5.

For practical reasons we are operating with squares, and therefore commonly there are many units of specific activity in each square. It is therefore possible to forecast what proportion of that activity still is left or has located in area after a year. Graphically,

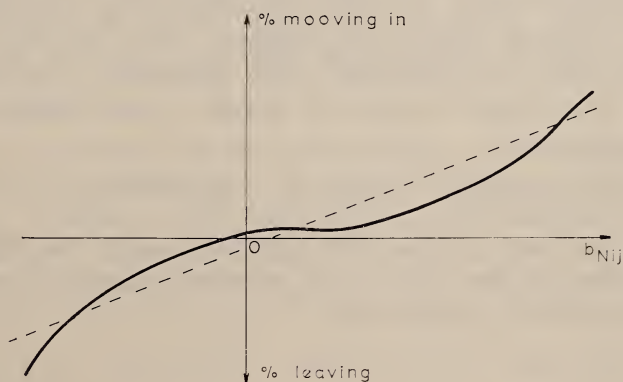


Fig. 6.

A function of the third degree seems to be the most appropriate, but in the initial phase it might be wise to approximate it by a linear function. Thus,

$$P^* = q \times B_N + t \quad (5)$$

where $P^* (n \times m)$ is the increasing or the decreasing proportion of an activity.

4. The benefit function

It is obvious that the benefit function will vary greatly with different activities. Thus, the benefit from housing, (population structure) is very different from that of retailing, or metal-manufacturing. Each activity must be given a different benefit function. In this paper we are only going to give a benefit function for retailing. The benefit for retailing is the sales. The sales are a function of the social and economic structure, but we cannot account for the whole structure S because the function will become too complicated. Therefore we must use only the most important part of S . A retailer is dependent on his customers, the distance from the customer to the retailer and the standard of the retailer. Here we can make use of a Baumol — Ide type of function. Let $P(N)$ be the probability of success for the customer in a given area where the retailers stock N different types of articles. ${}_{i'j'}D_{ij}$ is the distance from the customer living in square i,j to the retailer in square i',j' . C_d is the cost of travelling a unit distance. $C_N \sqrt{N}$ is an expression for the cost of shopping in a square (an area) with N different stocked items. C_i is the opportunity cost of deciding to shop. W and V are, respectively, subjective weights given to — success and cost of shopping. Thus we have a function $F(N, {}_{i'j'}D_{ij})$ giving the proportion of the population of an area i,j that will shop at a retailer in area i',j' during a given period. We have $(0 < F(N, {}_{i'j'}D_{ij}) < 1)$.

$$F(N, {}_{i'j'}D_{ij}) = WP(N) - V(C_d {}^x_{i'j'}D_{ij} + C_N \sqrt{N} + C_i) \quad (6)$$

If M_k is the matrix giving the population structure where $m_{ij}^{k'}$ is the population of the area i,j the number of people from area i,j shopping in area i',j' is given by

$$m_{ij}^{k'} \times F(N, {}_{i'j'}D_{ij}) = m_{ij}^{k'} \times [WP(N) - V(C_d {}^x_{i'j'}D_{ij} + C_N \sqrt{N} + C_i)] \quad (7)$$

The side of each square is a . For the distance we have, approximately,

$$i'j'D_{ij} = a \sqrt{(i - i')^2 + (j - j')^2} \quad (8)$$

By substituting (8) for $i'j'D_{ij}$ in (7) we get.

$$m_{ij}^{k'} \times [F(N_{i'j'}D_{ij})] = m_{ij}^{k'} \times [WP(N) - V(C_d a \sqrt{(i - i')^2 + (j - j')^2} + C_n \sqrt{N} + C_i)] \quad (9)$$

Let $s_{i'j'}$ be the average sales per customer in location (area) $i'j'$. By multiplying (9) by $s_{i'j'}$, we can calculate the sales to people living within i,j . (Note that by considering the income structure of the population we could improve our model.) By adding the sales from area i',j' over all areas we get the gross benefit $b_{i'j'}$ for the retailers in area i',j' . Thus,

$$b_{i'j'} = \sum s_{i'j'} \times m_{ij}^{k'} \times [W(P(N)) - V(C_d \times a \times \sqrt{(i - i')^2 + (j - j')^2} + C_n \sqrt{N} + C_i)] \quad (10)$$

From these $b_{i'j'}$, we can form the gross benefit matrix B or B_r for the retailers.

5. The cost function

The cost function for the different activities is very much the same. As a main part of it we find the rent surface. (The rent surface is a function of the social structure. This part of the theory has been developed further but we shall ignore it in this context.) The rent surface which is approximated by a matrix is denoted R ($n \times m$). The matrix gives us rent per sq-meter. By multiplying each element of R by its corresponding element in the retail-activity matrix M_r we get a total rent cost matrix C_R which gives us the rent cost in each area. E.g. each element in C_R is defined as

$$c_{ij}^R = r_{ij} \times m_{ij}^r \quad (11)$$

According to Baumol and Ide for retailing we can find a specific warehousing cost, but when it is closely related to rent we cannot use it here. Instead we will use a simple linear function for handling and clerical cost. These costs will be denoted by a matrix C_e ($n \times m$), and C_e shall be considered as proportional to the intensity of retailing in each area. Thus we obtain C_e by multiplying M_r by a scalar e . Thus,

$$C_e = e \times M_r \quad (12)$$

The final cost-function for retailing C_r will then be

$$C_r = C_R + C_e \quad (13)$$

and finally

$$C_r = C_R + eM_r \quad (14)$$

6. Location »probability» surface

By entering (4) into (5) we get

$$P^* = q \times B - q \times C + t \quad (15)$$

And by substituting B_r and C_r for B and C we get the forecasting function P_r for retailing. P_r can be considered as a probability surface where negative elements define the probability of moving out and positive elements, in a rather unorthodox way, define the probabilities of moving in.

If we specify these functions for all activities housing, retailing, catering, social-service, cinemas, shipbuilding, car-industry etc., we can make a computer program which simulates year by year the urban change process.

Likewise this surface system makes it possible to study optimal location of an activity over time, because of the dynamic properties of the model.

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THE EIGHTEENTH CENTURY MILITARY RECONNAISSANCE OF FINLAND

A NEGLECTED CHAPTER IN THE HISTORY OF FINNISH GEOGRAPHY

by

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A TRIBUTE AND A PLEA

The nature of Helmer Smeds's geographical interests regularly led him to early topographical maps. Many details in his doctoral study of Vasa skerries derived from the archive of the Land Survey of Finland. It was he who introduced me to it personally and he, together with Professor Eino Jutikkala, who encouraged me to go and inspect the reconnaissance survey maps of eighteenth century Finland (*Finska Rekognoseringsverket*) that are deposited in *Kungliga Krigsarkivet* in Stockholm.¹

As a geographer, Helmer Smeds sustained simultaneously an intense interest in Ethiopia and a fruitful concern for the broader human geography of his home country. His ability to balance these two research fields would have appealed to O. E. Wetterhof, one of the senior officers of the eighteenth century reconnaissance. In his *Military Description of Swedish Karelia*, a manuscript included in the reconnaissance archive, Wetterhof² was critical of "People (who) turn their backs on the fatherland to describe unknown lands in other parts of the world". He asserted that the frontier lands of Finland were no less worthy of attention than those of Africa.

This paper which considers the origins, nature and significance of *Rekognoseringsverket*, serves a double purpose. Firstly, it is a

tribute to the inspiration of a Finnish geographer with whom I shared twenty years of friendship. Secondly, it is a plea to encourage some future Finnish geographer to investigate a neglected body of material in the history of the subject.

THE ORIGIN OF THE SURVEY

The cartographic reconnaissance of Finland was very much a product of its age, for large-scale military survey was a feature of eighteenth century Europe. Britain and France were especially concerned and their methods and techniques were not infrequently adopted by others. In Britain, the first large-scale surveys were precipitated by the Jacobite rebellions in Scotland. Between 1747–55, a survey of the Scottish highlands was conducted under the leadership of General William Roy and his nephew Sir David Dundas.³ In France, large-scale survey was initiated by C-F Cassini (de Thury) in 1750, and in 1789, when the project was completed on a scale of 1: 86,400, it was the most extensive topographical map in existence.⁴ International rivalry in overseas territories encouraged British military survey in India, where the *Survey of India* was founded in 1767, and in North America, particularly in New York State. Out of the experiences and against the threatening background of the French Wars in the last decade of the eighteenth century, the British Ordnance Survey was born. Simultaneously, the inventive mood of the Industrial Revolution had its influence upon the production of improved survey instruments. Instrument-makers such as Ramsden, Dollond and Bird acquired international repute. Sweden-Finland shared in the products of Jesse Ramsden's workshop with its sixty technicians. In 1799, the Cambridge mineralogist Edward Clark encountered C. P. Hallström in northern Tornio valley and found him using "an excellent sextant made by Ramsden and one of Arnold's chronometers".⁵

While survey was a fashionable pursuit and new equipment had a novel appeal, the exercise had practical objectives. The military reconnaissance of Finland was an integral part of the defensive schemes that were centralised in *Finska Fästnings Kommisionen*. After 1721, there had been a small amount of mapping along the new Finnish frontier. The activity was locally intensified, especially in the Kymi valley, after 1743. In January, 1770, the King of Sweden wrote to August Ehrensward urging that a military survey of Finland be



Fig. 1. The Chronology of the Reconnaissance. The map is based upon *Relations karta som utvisar den recognoscerade delen af Finland uti ett Sammanhang samt serskildte hvarje år recognoscering til Lands, ifrån recognosceringens första början år 1776*: 1:650,000, Krigsarkivet, F. R. V., Relationskartor, Bf. 208 (2).

initiated. But Ehrensvärd's death two years later left the responsibility in the hands of General Stackelberg, whose first steps were to familiarise himself with the Fenno-Russian border and to assemble all available large-scale maps of Finland. Drawing offices were set up in Helsingfors and St. Michel. The former, under F. J. Nordenkrantz, was to become the focus of the Southern Reconnaissance; the latter, under G. M. Sprengtporten and initially concentrated on Savolax and Karelia, was to become the centre of the Northern Reconnaissance. From 1776 onwards, a series of instructions were issued on details to be included in the survey. C. N. af Klercker (1743—1817) took over the Southern Reconnaissance in 1779 and assumed the additional responsibility for the Northern Reconnaissance in 1780.⁶ It is apparent from af Klercker's zealously kept notebooks that he combined a close personal understanding of the Finnish countryside and a sound knowledge of geometry and surveying. His

own survey experience had begun along the south coast in the early 1760's, when he first helped to map the archipelago. In 1791, he became commander of the fortress of Sveaborg, with direct personal responsibility for the entire coastal and archipelagic survey. The work concluded under the supervision of C. N. af Klerker is summarised in Figure 1 which outlines the progress of the survey work in the two reconnaissance areas. Map-making and the preparation of the associated regional reports continued, but the climax of interest in the military reconnaissance of Finland passed with the death of Gustavus III in 1792.

THE CHARACTER OF THE RECONNAISSANCE MATERIALS

The array of manuscript maps and accompanying topographical descriptions, collectively known as *Finska Rekognoseringsverket*, represent the first attempt to produce a complete picture of Finland's lines of communication, the detail of its waterways and the pattern of its settlement. The reconnaissance was based principally upon field sketches, eventually reduced to a scale of 1:20,000. The manuscripts accordingly vary from simple pencil sketches incorporating topographical comments to fully coloured and finished documents. The final drawings of the reconnaissance made use of the maps of the civil land surveyor where possible, and draughtsmen from the Land Survey Office were occasionally recruited to help.⁷ The methods of recording were subject to certain variation and the name of the surveyor in charge was usually inscribed on the field maps. Where Swedish-speaking army units were conducting surveys in Finnish-speaking areas, they were provided with a list of Finnish place-name elements.

Figures 2 and 3 give an impression of the data recorded in the final version of the maps. They include relief, shown by hachures and spot heights, and waterways, with arrows indicating direction of flow. Trains of eskers, rock outcrops and eskers are interspersed with conventionally indicated woodlands and well-defined patches of water meadow. Estates, farmsteads, soldiers' holdings, peasant plots, stabling facilities, sawmills and grain-mills are often recorded by name. Many features bearing exclusively Finnish names were committed to paper for the first time. A numerical key to the routeways was provided by at least one master index map (reproduced as Figure 4); though roads, bridle paths, footpaths, winterways and boat routes were also



Fig. 2. Map of Jorois. This is a sample map from the March-Cartor of the military reconnaissance of Jorois, dated c. 1780.

numbered on local keys. From the commentaries that accompany the maps and from information inscribed on the maps it is possible to build up a systematic appreciation of the terrain, of traverses through it and, more occasionally, of particular regions.

At their best, the commentaries are a cross between topographical accounts and eighteenth-century English roadbooks. At measured intervals along the traverses distinctive features, such as settlements, bridge points or the nature of a local resource, are recorded. Landscape details accompanying the Jorois-Rantasalmi maps (Figures 2 and 3) indicate "good and fruitful soil separated by stonebound heather-covered

land"; "sandy mulls" yielding to "sandy lands with old fir trees"; runnels of mossland; boulder trains; evidence of former burning — "birch and aspen in abundance which must formerly have been *svedje*"; "average *svedje*" and other qualitative distinctions.⁸ Elsewhere, Savolax descriptions run through "hilly and stony tracts with deciduous and coniferous timber", "hilly country which is suitable for farm sites", areas that have suffered serious fires (sometimes precisely dated) and colonial settlements, to "widespread areas consisting mostly of swamps", or "swampy areas which can only be trasversed by the local inhabitants".

The nature of intervening waterways is described both from the point of view of navigability and of crossing. The entire lengths of some rivers may be described, e.g. Vanda river, tributary to old Helsingfors (cf. Figure 5). There may be a complete regional classification of waterways, e.g. a report on Savolax numbers the waterways and describes the character of more strategic stretches.⁹ Some are classified as "negotiable for the largest boats", others are "so shallow that even boats of the shallowest draft must be portaged". Where Vehmersalmi and Kallavesi meet, "the depth (is) marked in red figures". Some streams have "rapids that can be shot": others can be "passed with little *skötbåtar* though there must be adroit men at the helm". Variations in the level of waterways are indicated. On some water courses boats must be seasonally lightened by reducing the cargo, but other streams are "passable even in the driest season". Anjala area is described as being a maze of little streams and becks, "for the most part dry in summer"; while spring flooding may seriously afflict movement along them, e.g. for up to a week along Tallusjoki. The streams of Hittis suffer floods which carry bridges and fences before them. The hazards of ferry ways are recorded, e.g. Pulkila Sound and Lake Päijänne, which might be temporarily out of action in a northerly storm. Availability of boats is also noted in some areas. In Pyttis, for example, the hamlets of Vubole, Kungsbole and Näsby had ten boats each capable of carrying six or seven men: Finnby, Svenskby, Tavastby, Joensu, Havisto and Vatila each had one boat able to carry thirty to forty men.

Water-crossings at the intersection of carriage ways and bridle paths called for varied comments. They could be described as traversable by stepping stones, fordable, swimmable, seasonally impassable, "cannot be ridden through in summer", "not negotiable for horses", or defined in homely and helpful metaphor such as "no deeper than cattle can wade"



Fig. 4. A Master Map of usable Highways. Based on *Sammandrag öfver allmänna landsvägar uti Storfurstendömet Finland*, C. N. af Klercker, Rapport, Series A, 3, 1805.

and “no broader than a boy can jump over”. The fording horseman was glad to be warned of an obstruction such as the muddy Kristerinjoki (“well over a man’s height, with a soft bed and banks”) or of Sommar Lake along a tributary of Kymmene river with its swampy shores and deep waters “into which a horse should not venture”, to be advised of a tributary of Kallavesi that the “rider must walk over the bridge and let his horse swim alongside” or to be comforted that the Comiojoki was “hard-bottomed ... with clear water”.

Since af Klercker’s concern was with the nature of the land in relation to military movement, it was natural that strategic sounds, straits, bights, waterfalls, isthmuses, passes and bridges should be the subject of special maps. More than two dozen were identified in southern Savolax alone. They were mapped on scales of 1:2,000 to 1:10,000. Coastal tracts, subject to independent reconnaissance, were also identified where they provided strong points for embarkation or disembarkation, e.g. Stockudden in Tenala parish with “a well-defined sailing route through Jomfrusund to Sweden”, or Hangöudd “though it is exposed to the south-west”. The distribution of firm land was of primary importance in a country of widespread boglands. It was much more common in the south-west than in the east. Such a parish as

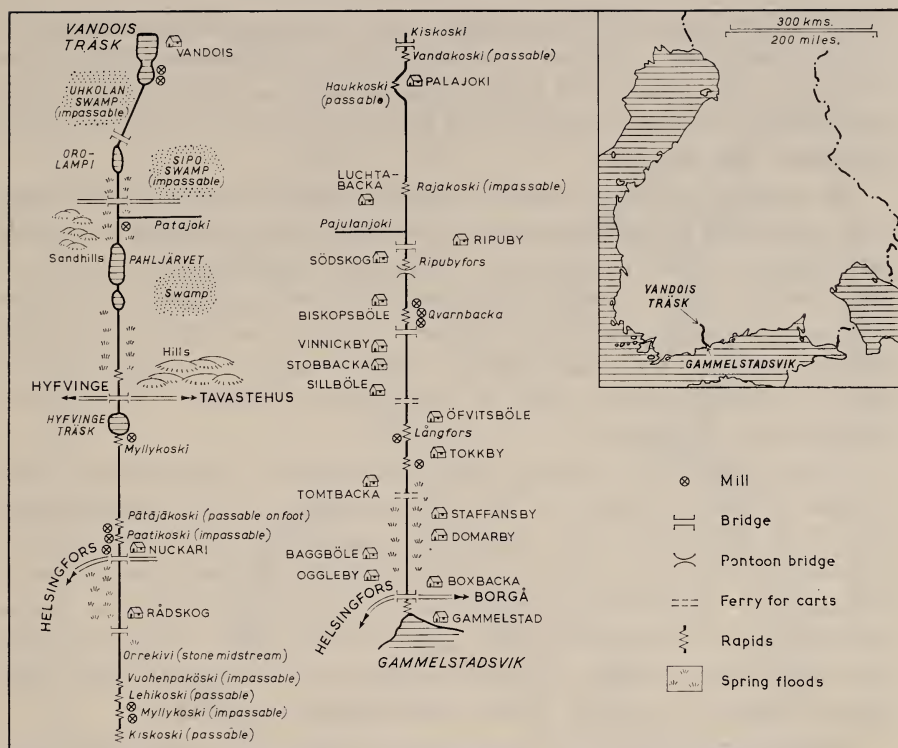


Fig. 5. Vanda River. The Vanda River was among those considered for canalisation during the eighteenth century. This diagram is a schematic reconstruction based on a military report accompanying the reconnaissance by C. N. af Klercker (Based on *Militäirisk beskrifning öfver Storfurstendömet Finland*, 1786, Series A, 4, Rapporter g. 36).

Liebelits was the despair of the soldiers, for it was full of “spongy and intractable” peatlands, where routes were frequently “passable on foot only in the driest summers”. Only rarely could the military topographer record such a solidly founded highway as “Wildmanstrands road along which cannons may be drawn”. “A good bridle path along a sandy esker” was about as much as could be anticipated.

Observations on agricultural landscapes were incidental rather than central to military concern. In Hauho parish, the farm scene might leave its impact through the prevalence of “rewarding agricultural land”; in Hallola, through the number of “trees for ships’ masts”.¹⁰ The soldier, concerned with movement through the terrain,

could sympathise with the farmer who had to contend with such a watery landscape. Vitasaari parish suffered settlements which were "cut off ... in autumn and spring until streams and lakes (were) again negotiable", while Itis parish could find but little use for "a tract that resembles the skerries".

In contrast to their limited concern with farming pursuits, those who conducted the reconnaissance were especially interested in prominent heights in the countryside. Although Salpausselkä threaded its way through their frontier territories, it lacked significant eminences. The surveyors did their best to prepare a map of the highest intervisible points between Lovisa and Nastola, where "signals of smoke by day and of fire by night" might be employed if needed.¹¹ The map is reproduced as Figure 6.

It was the frontier areas of the south-east that were the particular interest of those engaged in the reconnaissance. G. H. Sprengtporten and O. E. Wetterhof were concerned respectively with the neglected province of Savolax and the parts of Karelia that remained west of the border. Those who approached the problem of defence looked increasingly to southern Savolax as the critical tract. It was regarded as a buffer zone capable of absorbing the shock of invaders who might move towards Tavastehus or the Ostrobothnian coastlands.

Sprengtporten's work on the reconnaissance of Savolax yielded four types of map — a general map of the province in five parts, so-called *marche-cartor* of all the practicable routeways, maps of the border territories and special local maps of all strategic places and passes. The general map illustrated the thinning out of highways, byways and bridle paths in the north of the province: it also introduced the anastomosing watersheds or "false eskers" that were to become such a persistent feature of maps published in the following century. The type of detail recorded on the *marche-cartor* is illustrated in Figure 7.

Sprengtporten also produced a substantial accompanying topographical description.¹² For him, interior Finland more closely resembled a seascape than a landscape. Its defence had to be planned accordingly. The archipelagoes of the lake district were especially complicating. "The troublesome bights and gulfs in the heart of the country make protection difficult and defence impossible", Sprengtporten declared. Moreover, Lake Saima, hitherto "a shield", was "no longer a complete barrier", because the enemy shared its shores. Saima, indeed, was "an open way for raiders", backed and buttressed by fortresses origin-

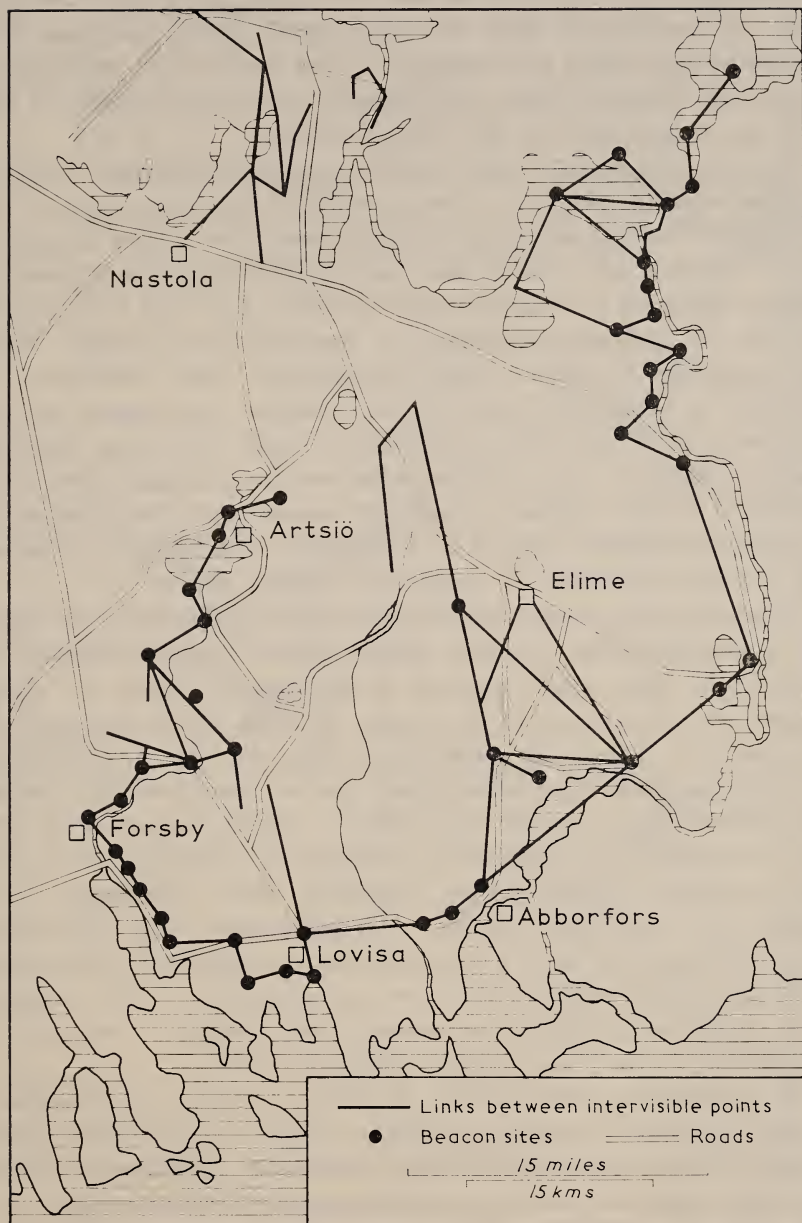


Fig. 6. Intervisible Beacon Hills on the south-eastern Marchlands of Finland.
Based on *Militärisck beskrifning*, Pt. 1, 1786, Series A, 4, Rapportör.

ally designed to protect Finland but now turned against it. The waterways, the location of their falls and rapids, their behaviour during the winter freeze and a knowledge of their boat routes were regarded as not less important than a knowledge of the land itself. A naval force was also needed on the interior waters.

In eighteenth century eyes, Savolax was an inhospitable waste with scattered oases of fertility. It was separated from Ostrobothnia by "a succession of wastelands which scarcely merit the trouble of acquaintance". Savolax was one of the least inhabited parts of Finland; but Kuopio, Idensalmi and Rautalampi, "richest in food and folk" of all the parts of the province, redeemed its reputation for sterility. Kuopio tract probably numbered 14,000 inhabitants. The Savolaxers were described as occupying roomy "smoke houses" surrounded by many small farm buildings. They relied upon "small, but strong horses" for draught purposes, which winter exhausted but summer grass rapidly restored. As the military observers moved into the interior they recorded the relative recency of settlement, the frequency of reclamation and the prevalence of rotational woodland firing.

Swedish Carelia, embracing the uttermost marchlands of the Empire, was a frontier zone. It was thinly people, loosely organised, and esteemed of little worth because of its hazards and of its absolute distance from the centre of the realm. In 1786, 20,251 taxpayers were recorded in it. It was the subject of a military report by O. E. Wetterhof, who presented it as a land that "has no formal military divisions, the inhabitants (of which) have taken it upon themselves to defend their boundaries".¹³ Wetterhof underlined the problems of movement and manoeuvre within it, the limitation of its resources and the fluidity of its settlement pattern. "By comparison with the cultivated lands of Finland (it was) a waste which on account of its widespread waterways can scarcely be traversed even in winter". In summer an army would be trapped in its swamps and mosses. It was not good campaigning country and lacked a *place d'armes*.

By comparison with the rest of Finland, Carelia was described as a tract of relaxed ownership conditions where "he who first cultivates a patch of land holds it as his legal possession". Property boundaries were not commonly marked on the ground, while the detail of the international boundary was also disputed.¹⁴ In common with such a frontier parish as that of Kuusamo, Carelia was a country of ambushes. Its settlements were also subject to Russian border raids. Both

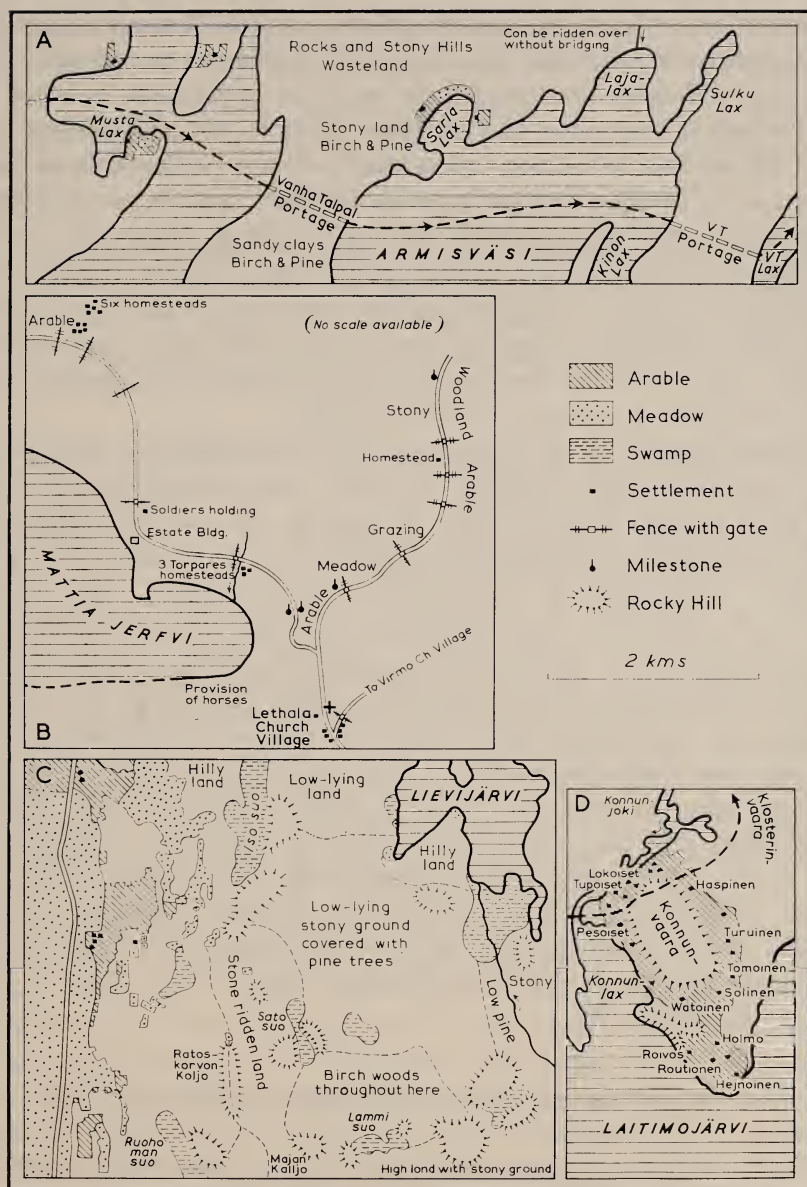


Fig. 7. Sample Details from the March-Cartor. The four maps have been redrawn from the originals. They indicate: —

- A. A sketch map from south Savolax by O. C. von Fieandt, c. 1780, showing the detail of lake and portage.
- B. A sample route from Laitila, in south-west Finland, representative of the routes shown on the general map series.
- C. Land use in Kauvatz chapelry, Eura parish, c. 1780.
- D. Tohmajärvi, by A. Wadman, 1786: scale 1:20,000, to illustrate the local range of place names to be found on the maps.

in their own interest and in those of the nation, Wetterhof held that the Carelians should be given more responsibility to protect their own territory. "Strange armies from the west can never grow to know the countryside in the same way or care about to the same degree" (p. 26). There must be reliance upon local patriotism. The intimate topographical knowledge of the Carelian hunters and traders should be capitalised. "Carelians trading with the Russian know the smallest trackways" (p. 27). They were a people who had been taught from childhood "to shoot a squirrel in the eye while skiing" (p. 37) and Wetterhof conceived a yeoman army of 6—7,000 men who could be readily mustered from their midst and who, when not needed, could "like the Romans go back to their farming".

Partly because of the circumstances of its settlement, Carelia was not a land that could provision an army. When troops came in, food had to be brought in too (p. 39). If need be, this could be transported over waterways, and substantial storehouses for 8—10,000 tons of grain could be established in the interior, e.g. at Joensuu. Rye, barley, oats and buckwheat were commonly cultivated; linseed and tobacco were readily grown; potatoes were scarcely known, peas were affected by frost, farm stocks were troubled by fodder shortage (p. 50). But if forests had suffered excessively from fire, they still provided wild deer for the chase, bears and wolves to hunt and were as rich in wild birds as their lakes were in fish. Tallow, butter and skins were sleighed by specially shod horses which were renowned for their sure-footedness and stamina, to be exchanged for salt, iron, coffee, lines, clothes and (more exotically) Circassian hides and English porcelain (p. 50). Carelia was a land retarded in its development by insecurity and, where the islands of settlement persisted, life in them was as if time had stood still (p. 60).

THE SIGNIFICANCE OF THE RECONNAISSANCE

Finska Rekognoseringsverket was the first widespread cartographic assault on the topographical detail of the Finnish countryside. It was pursued for over twenty years, but was never completed and never published. The enterprise suffered from shortage of funds and its participants from shortage of equipment. It had been the same in England and France. In 1756, the French exchequer withdrew support

from C-F Cassini's project: in 1763, William Roy had been entrusted with a survey of the whole of England, but the plan proved abortive for financial reasons.

A generation later, British authorities looked more circumspectly at the need for a nationwide topographical map. Roy argued the need cogently in a lecture before the Royal Society in 1783: —

Accurate surveys of a country are universally admitted to be works of great public utility, as affording the surest foundations for almost every kind of internal improvement in time of peace, and the best means of forming judicious plans of defence against the invasions of an enemy in time of war.

The military authorities were no less aware of the parallel significance of a reconnaissance in Finland. Firstly, it exposed national and local deficiencies in the system of communications and encouraged projects for development. The sparse and inefficient network of interior Finland was of especial concern. As a direct consequence of the survey, new roads were planned — for example, from Saarijärvi to Lappo, from Nurmes to Kaavi, and from Strömdalsbruk, by way of Muuruvesi to the Kuopio-Kaavi road. Secondly, the reconnaissance emphasised the need for a new understanding and management of the waterways. The military archive is littered with manuscript maps dealing with canalisation and drainage projects, though few seem to have been put into effect. Thirdly, the reconnaissance directed Finnish attention to its eastern marchlands, so that they were drawn into comprehensive schemes for defence. G. H. Sprengtporten, in his introduction to the *Military Description of Savolax*, echoed, in 1799, the final words of William Roy, "It is in the calm of peace time that a country should be studied; when war breaks out victory is then so much the more certain". Finally, the reconnaissance established new standards in military map-making. C. P. Hallström commented that af Klercker's work "was known to and respected by every enlightend and educated soldier".¹⁵ The materials were of practical significance for Hallström himself. Partly with their aid, he produced the first map book to present Finland in its entirety and in satisfactory detail. It was the second volume of *Geographiske chartor över Sverige*, bearing the name of S. G. Hermelin and published in 1799. The elaborate scissors-and-paste work of Hallström yielded six sheets, which were a national atlas in embryo.¹⁶

To the immediate practical significance of the reconnaissance may be added a continuing academic value. Although the maps are of varying accuracy and the descriptions reflect variable competence, so much is recorded on so many of them for the first time in the history of Finland that they constitute a record of considerable interest. Their value for a variety of disciplines lies in the large-scale of so much of the field survey. Their uniqueness lies above all in their detailed record of place names, which makes them especially useful for the study of toponymical and ethnographic change. An excellent illustration is provided by the map materials relating to the parish of Nousio.¹⁷ At their best the complete maps may be described in the words that William Roy used of his own Highland Survey — “rather ... a magnificent military sketch”. By any European standards, Finland’s eighteenth century cartographic heritage is impressive. That part of it which derives from the military reconnaissance has yet to be assessed at its true worth.

FOOTNOTES

¹ The first printed statement on the eighteenth century military survey of Finland is »Beskrifning om Finlands Rekognoscering», *Svenska krigsmanna sällskapetets handlingar*, Stockholm, 1798, 3, 1. An introduction to the material has been prepared by Ryttmästare S. Wawrinsky, *Finska rekognoseringsverket*, Typescript, 1931, Kungliga Krigsarkivet, Stockholm. In this paper, I have used throughout the Swedish placename forms employed by the original surveyors.

² *Militarisk beskrifning öfver svenska Carelen samt tankar om dess försvar*, Kungliga Biblioteket, Stockholm, M. 150.

³ G. Macdonald, *General William Roy and his military antiquities*, London, 1917.

⁴ *Description géométrique de la France*, Paris, 1783.

⁵ Edward Clarke, *Travels in various parts of Europe, Scandinavia*, London, 1824, Vol. IX, p. 338.

⁶ *Bref och anteckningar*, Kungliga Biblioteket, Stockholm, 18 Fol.

⁷ C. N. af Klercker, *Brevsamling*, Kungliga Biblioteket, Stockholm, Ep. K. 6, 1780.

⁸ F. R. V., series A, Kymmenegårds län, I, M.c.II.

⁹ F. R. V., *Rapporter*, series A. 9f.

¹⁰ F. R. V., *Geografisk beskrifning öfver Nylands, Vasa och Uleåborgs läner*, *Rapporter*, series A, 7.

¹¹ F. R. V., *Militäirisk beskrifning*, Part I, 1786, *Rapporter*, Series A, 4.

¹² F. R. V., *Militäirisk beskrifning öfver Savolax författad på Brahelinna år 1799*, *rapporter*, series A, 1.

¹³ *Militäirisk beskrifning öfver svenska Carelen etc.*, op.cit., the quotations are drawn from this source.

¹⁴ F. R. V., series A, *General kartor*, 9.E.1, XXXB, »line of the Russian claims» and XXXA »boundary of the Swedish claims».

¹⁵ *Svensk Vetenskaps Akademiens Handlingar*, Presidential address, February, 19, 1812.

¹⁶ *Geographiske chartor öfver Sverige med Hans Majest: Konung Gustav IV Adolphus allernådigste Tilstånd utgifne af Friherre S. G. Hermelin. Andra afdelningen, Storfurstendömet Finland*, Stockholm, 1799. The working materials are in *Hermelinska samlingen*, Vols. 2 and 3, Krigsarkivet, Stockholm.

¹⁷ R. R. V., series A, 9b, *vård VI*, 11.

On completing this paper, I am very conscious of the debt that I owe to members of the staff of Krigsarkivet in Stockholm for their sympathetic and practical help in making available so much archive material to me.

THE ROLE OF TEMPERATE CROPS IN THE KENYA HIGHLANDS

by

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Many temperate crops have been introduced into the Kenya highlands only within the last sixty or seventy years. This has brought about a great extension in agricultural land use and an increase in population and settlement in the higher altitudes.

The Kenya highlands rise on either side of the eastern or 'Gregory' Rift Valley and range from 1,500 m above sea level to a highest point on Mt Kenya of 5,200 m (17,058 ft.), with considerable areas between 1,500 m and 3,000 m. They form a striking example of the modification of climate with altitude with resulting effects on natural vegetation and on agricultural possibilities.

The evidence for the distribution of population at the turn of the century is scanty and non-statistical. That from early travellers is largely negative. Thus they always commented on the local people where there were any to comment upon but where they crossed over the higher areas (2,000 m to 2,500 m) there are descriptions of forests or open grasslands but not of people or settlement. Tracks were generally absent and the rare person who was found (often a Dorobo hunter) was valued as a guide. A little later, the administrators and early settlers reported upon the emptiness of areas which became part of the "White Highlands". (It was this lack of population which required the immigration of labour).¹

¹ For early accounts of conditions at high altitudes see especially: Thomson, J. (1885), *Through Masai Land*, London; *Report on Mombasa Victoria Lake Railway Survey* (1893), Cmd 7025, London; *Report of the Kenya Land Commission* (1933), Nairobi (The 'Carter Commission'). See especially evidence Vol. III).



Fig. 1. Approximate altitude limits of crops in the Kenya highlands.

Bulrush millet — *Pennisetum typhoideum*; Cassava — *Manihot utilisissima*; Bambara groundnut — *Voandzeia subterranea*; Sugar — *Saccharum officinarum*; Robusta coffee — *Coffea robusta*; Sorghum — *Sorghum vulgare*; Sweet potato — *Ipomea batatas*; Taro — *Colocasia esculenta*; Banana — *Musa* spp.; Finger millet — *Eleusine corocana*; Maize — *Zea mays*; Sisal — *Agave sisalana*; Arabica coffee — *Coffea arabica*; Irish potato — *Solanum tuberosum*; Tea — *Camellia thea*; Cauliflower — *Brassica capitata*; Wattle — *Acacia mollissima*; Wheat — *Triticum vulgare*; Cabbage — *Brassica oleracea*; Peas — *Pisum sativum*; Runner beans — *Phaseolus multiflorus*; Lima beans — *P. lunatus*; Pyrethrum — *Pyrethrum cinerariaefolium*; Barley — *Hordeum vulgare*.

The principal reason for this lack of population is clear when we consider the list of crops grown at the time. They included: maize, millets, sorghum, sesame, sweet potato, bananas, cassava and taro. With increasing altitude, conditions became less favourable for these crops. The altitudinal limits are not sharp or rigid but they are shown diagrammatically in the figure. Little detailed work has been done on the altitudinal limits of crops in the Kenya highlands and the diagram summarises general agricultural opinion as expressed in government reports, books and articles.¹ These authorities have normally expressed

¹ Greenway, P. J. (1944–1945), Origins of some East African food plants, *East African Agricultural Journal* X:1–XI:5; Matheson, J. K. and Bovill, E. W. (1950), *East African Agriculture*, London; Saville, A. H. et al. (1958–1959), Notes on Kenya Agriculture, *East African Agricultural and Forestry Journal* XXIII: 4–XXIV:4; Brown, L. H. (1963), *A National Cash Crops Policy for Kenya*, Nairobi; Kroll, U., *The Cultivation of Pyrethrum in Kenya*, Nairobi.

these limits in feet. It will be seen that there is a general upper limit of about 6,000 feet (a little below 2,000 m). At this altitude in East Africa the mean annual temperature is approximately 18°C (64°F) with a small annual range. It is interesting that the boundary between Köppen's megathermal (A) and mesothermal (C) climate is drawn where the coldest month falls below a mean temperature of 18°C. A favourable aspect, soil or other local conditions will permit growth at a higher level and it may be possible to rear a crop above the indicated altitude provided extra care is taken but it may take considerably longer to ripen. Thus the faster growing and heavier yielding varieties of cassava grow at the lower altitudes and maize may take over a year to reach harvest at 8,000 feet. It is true that selective breeding has and is extending the altitudinal range of crops in Kenya, especially maize, but this was unknown in 1900. The higher altitude grasslands were used by pastoral peoples but usually only seasonally or in time or drought in the savannas. The pastures did not seem to be very attractive and it may be suggested that mineral deficiencies and lung ailments were a disadvantage. Also it must be remembered that a cool damp climate with seasons of mist is not attractive if home is a simple hut and warm clothing is restricted to skins. This might be tolerated if there were no alternative but in Kenya it could easily be avoided by living at a lower altitude.

Archaeological evidence of early settlement in the high grasslands consists of circular pits or "*sirikwa* holes". These appear to have been essentially stock pens and little evidence has been found of agriculture. It is interesting to speculate however, whether the early occupation by cushitic peoples known to have taken place involved the cultivation of wheat, barley or *teff*, brought from the Ethiopian highlands and subsequently forgotten.¹

Although exotic crops, especially maize, had reached the Kenya highlands earlier, it was not until the colonial era at the end of the nineteenth century that knowledge of the wide range of crops available in the world reached them. Agricultural officers and settlers experimented vigorously, particularly to establish which would be the most successful crops for the higher altitudes and the approximate limits of those which have become most important are also shown in the

¹ Sutton, J. E. G. (1966), The Archaeology and early Peoples of the Highlands of Kenya and Northern Tanzania, *Azania* I, 37—58.

diagram. In a similar way, exotic breeds of cattle and sheep were introduced (especially Guernsey and Ayrshire cattle and Merino and Corriedale sheep). Not only did the climate remind the British immigrant of home (albeit rather more pleasant) but he was able to make himself comfortable with substantial houses and clothing of woven cloths, including the raincoat.

Although these importations of crops, animals and material culture were made by Europeans (frequently using the services of Asian merchants) they were thence, of course, available to the indigenous peoples who were encouraged in their use by Agricultural Department Officers and who gained experience of them at first hand from working for settlers.

The most immediate and direct result was to be seen in those areas taken up and farmed by Europeans in the "White Highlands" after about 1902.¹ Following political changes, the position is altering, but the basic crop patterns etc. remain and it may be instructive to look briefly at farming in one such area, Molo, as reported by the Farm Economics Survey Unit for 1961—62. The Molo farmland lies at 2,400 m to 2,700 m on the western flanks of the Rift Valley. Its original state was mixed temperate forest and open grassland, uninhabited except by a few Dorobo hunters. Twenty farms were sampled which together reflect fairly accurately farming in the area as a whole. The figures for land use and sources of farm profits are given in Table 1. From this it can be seen that virtually all of the cash crops are introduced: wheat, barley, oats, potatoes and together with pyrethrum, also introduced, they occupy 30.15 % of the usable land and provide 60.31 % of the total farm profit. The breeds of livestock are not recorded but the majority of the cattle would be either pure-bred exotics (especially for dairying) or grade cattle with a proportion of indigenous blood and the sheep would be almost entirely exotic, originating either in Europe or Australia. To English immigrants this area seemed particularly attractive. One of the factors concerned may have been the possibility of rearing riding horses (including hunters) and polo ponies, which is made impossible by disease at lower altitudes.

The same process has been at work in the areas of purely African farming. The agriculture of the Kikuyu areas of the highlands was well described by early travellers and in the Routledges' detailed

¹ Morgan, W. T. W. (1963), The »White Highlands» of Kenya, *Geographical Journal* 129: 2, 140—155.

Table 1. *The Farming System in the Molo-Mau Narok Area 1961—62. Average of twenty farms.*

A. *Sources of Farm Profit*

Percentage of total Farm Profit derived from:—

Cash crops	28.79
Pyrethrum	31.52
Stock	35.38
Other receipts	4.31

B. *Land Use*

Percentage of all usable land used for:—

Cash crops	25.00
Pyrethrum	5.15
Fodder crops & new leys	10.27
Permanent pasture & old leys	59.58

C. *Cash Crops*

Individual cash crop acreage as a percentage of total cash crop acreage:—

Wheat	53.74
Barley	31.13
Oats	11.02
Potatoes	3.26
Other cash crops	0.85

D. *Livestock*

Type of livestock as a percentage of total livestock units:—

Dairy cattle	31.23
Beef cattle & oxen	12.43
Sheep	50.94
Pigs	4.74
Poultry	0.08
Horses	0.58

Source: MacArthur, J. D. and England, W. J.: A Report on an Economic Survey of Farming in the Molo-Mau Narok Area 1961—62.

Nakuru: Farm Economics Survey Unit Report No. 12 — March 1963.

account of the tribe.¹ Farmland was cleared from the forest, cultivated with the digging stick and the hoe and the principal crops grown were maize, millet, cassava, sweet potatoes, bananas and taro. The settled areas were at the lower levels, leaving a belt of 'boundary forest'

¹ von Hohnel, L. tr. Bell, N. (1894), *The Discovery of Lakes Rudolf and Stephanie*, London; Routledge, W. S. and K. (1910), *With a Prehistoric People*, London; Middleton, J. and Kershaw, G. (1965), *The Kikuyu and Kamba of Kenya*, London.

towards the Masai on the plains and extending upwards through the star grass and Kikuyu grass ecological zones. With increasing pressure of population, more forest has been cleared in an uphill direction, which led to the establishment by the government of reserves to protect the Aberdare forests. This was the less popular area because traditional crops were slow to grow or would not grow at all, only one harvest was generally possible within a twelve month period instead of two and the cold, misty period of July and August (the *githano*) was most disliked. Nevertheless, densities of one or two hundred per square mile are now common in locations at the edge of the forest between 1,800 m and 2,300 m. This is the "bracken zone" so called because bracken (*Pteridium aquilinum*) establishes itself in land cleared from the forest at this altitude. The crops recommended for this zone by the Agricultural Department are all exotics; tea, wattle, pyrethrum and Irish potatoes, with dairying as an important constituent of the economy. Successful pioneering by peasant farmers in this zone has been largely dependent upon importing good quality exotic milking cows, the establishment of cooperative tea factories and the building of pyrethrum driers. These new developments mean that areas of the Aberdare forests before regarded as of little use are now covered by the peasant farmer. This presents government leaders with the need to make an embarrassing policy decision: whether to maintain the forest in the name of conservation of natural resources or to make a present of it to their land-hungry supporters.

A similar movement into the upper areas of the other highland areas in East Africa has occurred. Both Africans and Europeans have been involved in the Northern Highlands of Tanzania and in the Matengo highlands flourishing settlement may be seen based on wheat introduced by missionaries to which pyrethrum is being added at the suggestion of the Agricultural Department.

Brief as is the above account, it is still possible to suggest a tentative general conclusion. In East Africa the material culture was adapted to the major environmental niches, but not to the exceptional one of high altitudes. Utilisation of these areas awaited the importation of cultural features developed in temperate latitudes where a climate similar (not identical) to that in tropical high altitudes is the norm.

ON THE CONCEPT AND DELIMITATION OF THE PRESENT-DAY PROVINCES OF FINLAND

by

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Several different regional divisions of Finland have been made on formal grounds. The number of divisions varies, according to the degree of generalization, from eight (Smeds 1960, p. 152) to several dozen (Aario 1960, 4/38). J. G. Granö (1931), for his part, has proposed a division of the country on the basis of a scientific analysis of the landscape into sixteen geographical provinces; but his proposal also represents a generalization drawn from a formal regional division. Comparatively little attention has been paid in Finland to divisions carried out along functional human-geographical lines.

At the beginning of the present decade, the existing provinces of Finland became the subject of lively public discussion. As a general observation, which, to be sure, may be somewhat sharpened, it may be stated that the provinces have been visualized in a historical perspective, various objectives have been set up for the diversification of the service facilities of the provincial centers, and policies aimed at promoting the welfare of the provinces in general have been espoused; but nevertheless there remains a scarcity of genuine research data collected, with the object of precisely defining and characterizing in regional terms the provinces as they exist today. The Finnish "maakunta" or province has been defined in many ways, furthermore, and in general each definition differs from the others, even with respect to fundamentals.

THE CONCEPT OF THE CONTEMPORARY FINNISH PROVINCES

The Finnish province is a geographical entity, one formed on the basis of its inhabitants' sense of historically belonging together, a region in many cases demarcated by natural boundaries. This definition is drawn from the encyclopedia published by Otava (Helsinki 1963, p. 1093/5). From the geographical standpoint its main interest centers on the last reference, probably signifying the natural geographical boundary zones, such as, for example, the Suomenselkä watershed, which separates the province of *Pohjanmaa* (Finnish Bothnia) from neighboring regions to the south. "Historically belonging together", again, is an expression covering so much ground that it has little operational value in, for instance, any endeavor to draw accurate boundary lines for the present-day Finnish provinces.

Raimo Kanerva (1965, p. 126), it seems to me, has quite accurately described the thinking of the average urbanized Finn about the matter: "The province is frequently thought of in terms of an entity marked by a sense of affinity among the inhabitants or by common local traditions and interests, which entity is of significance in contemporary life at most as a geographical concept." Insofar as the two last words of this definition are generally understood in the same way as in circles devoted to geographical research, then the Finnish province truly represents a diversified and important regional unit. The mode of treatment of Kanerva's article indicates that he wants to consider the province as an *economic area*.

The ideal province of administrators (Sipponen 1965, Hulkko 1965) can perhaps be best characterized as a high-level self-governing region organized along the lines of lower-level autonomous areas with its own executive and administrative agencies. These agencies would be charged with duties now entrusted to the district authorities of special administrative organs of the State, municipal leagues and even civic organizations as well as, in addition, certain tasks (e.g., provincial administration of culture) that nowadays either have no place in the Finnish scheme of administration or are attended to with little effect from the national capital. In recent literature dealing with the subject, I have found no detailed characterization of the features of a province in the form of a definition viewed in an administrative light.

Kustaa Vilkkuna (1966, p. 8), in a booklet entitled *Maakunnissa Suomen tulevaisuus* (The Future of Finland Lies in Her Provinces), has conceived of a province as being a region where the inhabitants

speak an exceptionally homogeneous dialect and share numerous similar ideals of behavior and to a high degree a common history. These features apply particularly to *Etelä-Pohjanmaa* (South Bothnia) but can probably be generalized to apply to other provinces as well. Vil-kuna (1966, p. 10) has also emphasized that the provinces have not existed for centuries unchanged, but that various circumstances have been at work molding them and that new centuries have created new provinces. Vil-kuna's province is thus a regional unit distinguished by its dialect and folk culture, although he does, on the other hand, also lean toward the functional approach in endeavoring to locate the centers of his provinces.

In dealing with the province as a geographical concept, Oiva Tuominen (1965, p. 16) emphasizes that the modern approach is to a decisive degree a *functional* one. The structural features of a province would therefore largely adhere to the structural pattern of spheres of influence on a corresponding level, with their characteristic functionally scaled centers and corresponding areal divisions. Inasmuch as the nature of this kind of functional entity involves a non-homogeneous landscape, there would be no point in seeking a regional homogeneity. Common *historical* traditions ought not to be given other than a secondary significance, either.

Also Auvo Kiiskinen (1965, pp. 22—26) regards the province as an *economic community* manifested by functional bonds and marketing forces; but he likewise attaches importance to regional self-assertion, a *provincial spirit*, which should be taken into account as a reality that fundamentally characterizes regional economic communities and greatly reinforces their sense of solidarity.

The regional division of the seminar on provincial policy of the Lahti summer university (Suomalaisuuden liitto 1965, p. 166), which has kept a record of the majority of views expressed on the matter and considered here, formulates the concept of the Finnish province for its own part as follows: "A province is a regional entity corresponding to a natural economic region that can be distinguished from its surrounding areas by virtue of its functional orientation." This definition is not so successful as it might be. In the process of condensation, it has lost too much of its factual substance. The definition quite rightly, in my mind, emphasizes function, but the functional level is not made clear. The definition also stresses the importance of economic orientation, but the word "natural" in this

connection has a strange ring. It hardly suggests factors of natural geography. It should further be pointed out that an economic region might be of the order of magnitude of a province — but it could also be smaller or larger. The concept of functional economic region is *relative* and *scaled* in the same way as the concept of a supply area or sphere of influence.

The application of the meritorious but nevertheless highly generalized definitions given the Finnish province for the purpose of carrying out concrete studies of provinces is not altogether easy. In my opinion, the definitions should be both combined and made more precise. Such an attempt would probably succeed best in connection with a practical research task, which would facilitate checking the validity of the hypotheses in the light of empirical data.

THE FUNCTIONAL PROVINCES OF TODAY

An abundance of material is available for the demarcation of provinces in Finland on functional grounds. In part, the material consists of studies already published; but the provinces are not clearly cited in them, though the results would make it possible — as, for example, in the delimitation of spheres of influence based on newspaper circulation (Raninen—Puukari 1947) or the proposal for a new division of administrative provinces based on the regions incorporated into the State system of district administration (Aluejakomitean mietintö 1953). It was not until 1967 that a study designed to demarcate the functional provinces of the entire country on a basis of varied factors was completed (Palomäki—Granfelt—Palmgren et al 1967). The following discussion is based on the already published material included in this work.

The demarcation of a functional province involves two tasks. First, such centers must be established as functioning on the provincial level (Fig. 1). Second, the spheres of influence of these centers must be delimited.

It was possible to draw on previously available data from many fields in locating the provincial centers and fixing the boundaries of the different provinces. For example: it is relatively easy to obtain various administrative district divisions even on the provincial level in such abundance that the regions can be reliably generalized by

synthetic methods. In the demarcation of provinces, also such data must be obtained as would indicate the spontaneously generated orientation of the population among the various centers. At the present stage of development of the science, it is not possible to obtain material of this kind for studies of a hierarchical nature except by the inquiry method. A fairly lengthy questionnaire was sent to all the rural primary schools in the country requesting the teachers to evaluate the average behavior of the inhabitants of their school district in seeking services. The method naturally contains the possibilities of error, but in dealing with simple matters the questions asked nevertheless seem to fetch reliable responses. The number of questionnaires filled out was surprisingly large — well over five thousand teachers responded. They are spatially distributed in a manner corresponding quite well to the regional distribution of the Finnish population. Accordingly, the picture they give of the boundaries of the spheres of influence may be regarded as reliable and representative.

Since dozens of different cartograms could be drawn on the basis of the material, it became necessary at the publication stage to combine several analytic maps on the same cartogram. This made it essential to reduce the data included so that only the location of the service under examination and the boundary of its functional area could be marked on the final map. As the function representing the same branch of activity were assembled on the maps from the provincial level, too, the components of the provincial-level service facilities and the corresponding spheres of influence in the different branches of activity could be directly established (Palomäki—Granfelt—Palmgren et al. 1967, Cartograms 6—7, 14, 19, 25 and 31). The centers ultimately operating on the provincial level can be ascertained by combining the components into complexes (Palomäki—Granfelt—Palmgren et al. 1967, Cartogram 36).

It may be observed from any analytical presentation whatsoever dealing with a hierarchical system that services belonging to any given level are scattered even among centers where, in principle, they ought not to occur (Fig. 1). In order to eliminate this disturbing factor from the classification of central places, the so-called majority principle is observed. Only those centers are considered operational on any given level, such as the provincial level, that possess more than half the functions of the branch of activity under examination among their service facilities. This enables the majority of the

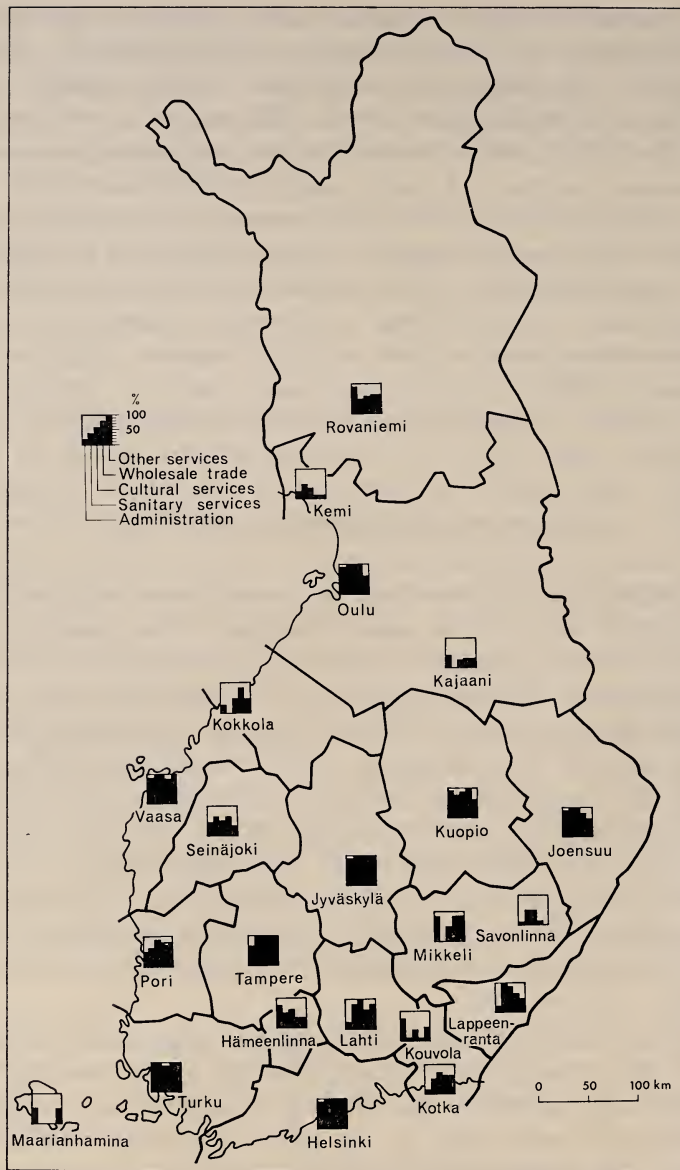


Fig. 1. The determination of the central places functioning on the provincial level, and the boundaries of the functional provinces. The content of the central places is represented proportionally according to spheres of activity by having the black portion of the column indicate the quantity of functions occurring in each center as a percentage of all the functions on the provincial level within the sphere of activity in question.

inhabitants of the area around the centers to satisfy their service needs on the level in question locally. The aim in drawing the boundaries of the synthetic spheres of influence is to ensure that each center be stronger in its own area than any other central place on the level of the activity being studied.

With respect to *administration* the indicators on the provincial level had to be divided into two parts. In general, indicators relating to "lääni" administration existed in only 12 centers, whereas certain clearly provincial services could be offered from more than 20 centers. All told, 27 provincial administrative agencies were available, and this means that the result can be considered quite reliable as far as the material is concerned. In the demarcation of the administrative provinces a more multifaceted regional division than the formal division of Finland into *läänis* was finally decided upon.

With respect to *cultural activity* it was possible to use only ten indicators on the provincial level and four spheres-of-influence boundaries. Since these were drawn on the basis of the material compiled by the questionnaire method, they do not totally coincide with the administrative boundaries. In the determination of the provincial centers on the basis of *sanitary services*, only six indicators were in use and two boundaries obtained by the questionnaire method. The results accord more nearly with the regional division based on cultural activities than on administration.

The classification could not be extended up to the provincial level in the field of the *retail trade* because the material compiled did not prove to be sufficiently finely divided. The *wholesale trade*, on the other hand, yielded good data. The sites of the six most important central wholesale offices in the country could be marked on the map along with their marketing areas. Finland has 17 sufficiently developed wholesale trade centers, and when the functional economic provinces are demarcated as their spheres of influence, the number of provinces arrived at is also 17, insofar as heavy emphasis is placed on economic activity. With respect to *other services* the analysis of the centers succeeded moderately well — with six indicators —, but in the demarcation of the spheres of influence only the distribution areas of the branch offices of the Bank of Finland could be used.

The functional Finnish provinces of today are determined by combining the five maps discussed in the foregoing so as to form a complex on the provincial level. The sphere of influence of other

services is not used because too little information is available in this respect. The picture given by the map has been influenced by 55 different kinds of provincial central services and 44 analytical boundaries. The same weight is placed on the various fields of activity of the centers so that they might become characterized impartially.

A total of 17 centers (Fig. 1) has passed scrutiny, which signifies that the same number of contemporary functional provinces has evolved in this country. Only two other central places have come close to fulfilling the requirements for acceptance into the provincial category. One is *Savonlinna*, situated at the eastern edge of the main lake district, and the other is *Kouvola*, caught in the squeeze of large neighboring centers vying for predominance. The elimination of *Kajaani* by a clear margin from the group of provincial centers proved to be one of the biggest surprises sprung by the study.

THE PROVINCES IN THE LIGHT OF PUBLIC OPINION

In the national survey of opinion on the hierarchy of central places and spheres of influence, this question was also asked of the primary school teachers: "To what province do you consider your school district to belong?" The responses to this question are applicable, on the one hand, to the demarcation of provinces as viewed in a formal light and, on the other, to checking the validity of the boundaries given present-day provinces according to functional criteria.

It was quite surprising to see that among the teachers' responses there occurred as many as 54 regions conceived of as provinces, or three times the number of functional regions (Table 1). On the basis of the numerical distribution of the responses, however, it is possible to make a clear distinction between the regions actually regarded as provinces and those characterized as such on more or less random grounds. If a minimum frequency of 50 responses be required, which is by no means an unreasonable high requirement in the face of more than 5,000 responses seeking to characterize areas the size of a "maakunta", the group shrinks down to 24 regions. Only the Åland Islands, which contributed 28 responses, are left out because the population, too, is small.

The diversity of the responses is partly due to the fact that the teachers had in some cases misunderstood the designation of "province" to mean a so-called *historical province*, of which there are

Table 1. The numbers of responses received in the public opinion survey on Finnish provinces and the percentages of the total number of responses.

Name of province	Responses		Name of province	Responses	
	No.	%		No.	%
Savo	370	7.19	Länsi-Pohja	36	0.70
Etelä-Pohjanmaa	359	6.98	Ahvenanmaa	28	0.54
Häme	346	6.73	Keski-Savo	24	0.47
Varsinais-Suomi	333	6.48	Lounais-Häme	19	0.37
Satakunta	318	6.18	Pohjois-Häme	18	0.35
Pohjois-Karjala	312	6.06	Pohjois-Satakunta	18	0.35
Pohjois-Pohjanmaa	301	5.85	Itä-Savo	17	0.33
Keski-Suomi	289	5.62	Savo-Karjala	15	0.29
Pohjois-Savo	219	4.26	Åboland/Turunmaa	15	0.29
Keski-Pohjanmaa	218	4.24	Koillis-Lappi	14	0.27
Uusimaa	202	3.93	Vakka-Suomi	12	0.23
Kainuu	198	3.85	Etelä-Lappi	12	0.23
Kymenlaakso	154	2.99	Kanta-Häme	9	0.18
Pirkanmaa	152	2.95	Länsi-Lappi	9	0.18
Lappi	139	2.70	Järviseu (E-P)	9	0.18
Etelä-Karjala	115	2.24	Länsi-Uusimaa	7	0.14
Österbotten	113	2.20	Länsi-Savo	5	0.10
Karjala	109	2.12	Päijät-Häme	5	0.10
Nyland	93	1.81	Itä-Uusimaa	5	0.10
Perä-Pohjola	91	1.75	Koillis-Savo	3	0.06
Etelä-Savo	84	1.63	Kymi	3	0.06
Koillismaa	73	1.42	Suupohja	3	0.06
Etelä-Häme	68	1.32	Keski-Karjala	2	0.04
Pohjanmaa	64	1.24	Keski-Häme	2	0.04
Itä-Häme	47	0.91	Keski-Uusimaa	2	0.04
Ylä-Savo	44	0.86	Länsi-Karjala	1	0.02
Suur-Savo	40	0.78	Raja-Karjala	1	0.02
Responses total	5,145	100.00 %			
Functional provinces	3,516	68.17 %			
Historical provinces	2,002	38.92 %			
Functional and historical provinces, combined	4,432	86.17 %			
The foregoing plus Kainuu, Perä-Pohjola and Koillismaa	4,794	93.19 %			
Other regions	351	6.81 %			

nine in Finland. Such responses accounted for some 39 per cent of the total. However, this figure includes some contemporary provinces as well, for, e.g., *Uusimaa*, *Varsinais-Suomi* and *Satakunta* are both historical and present-day provinces. The name of a *functional present-day province* was given by approximately 68 per cent of the respondents. This is an interesting result as functional provinces account for only 31 per cent of all the reported regional units. To at least two-thirds of the respondents the present-day province has such great

importance that they select it for their answer. If the historical and present-day provinces are counted together, the proportion of responses referring to them rises to about 86 per cent, although there are only 23 regions, or 42 per cent of the entire group. If the regions of *Kainuu*, *Perä-Pohjola* and, somewhat stranger, *Koillismaa*, which were cited by numerous respondents, are added, the figure exceeds 93 per cent. This would leave less than 7 per cent to the 28 smaller regions.

Public knowledge of the provinces may thus be considered fairly good in Finland. The province as a regional concept may also be considered to be a matter of everyday significance in the lives of people. This conclusion is influenced by the character of the respondents to the questionnaire. As part of their routine teaching chores, primary school teachers are obliged to explain to their pupils the things that go to make up the provinces of Finland. The boundaries of 18 "new provinces" are also presented in a recently published textbook (Mäkelä 1967, pp. 29—30). Nevertheless, this did not prevent deviating opinions from being expressed both with regard to the names of the provinces and their geographical division.

A regional review of the responses received to the questionnaire (Appendix 1) reveals many interesting results. The map shows that the sense of belonging is felt in quite different ways in the Finnish provinces insofar as the choice of name is concerned. In Lapland approximately one-half the responses referred to the region by some other name than *Lappi*, as, for example, *Peräpohjola* or *Länsi-Pohja* (= the Far North, West Northland). In the administrative limits of Oulu lääni there are several provinces. *Pohjois-Pohjanmaa* is the one rooted deepest in the minds of respondents, and this name appeared frequently also among the other provinces believed to exist in the administrative district. *Kainuu* is a province that was not sufficiently strong to emerge as a functional entity, but in the survey of teachers' opinions it proved to be quite clearly delineated — on the basis of the responses it emerged as a homogeneous provincial entity. A region that aspired to become established as an entirely new province was *Koillismaa* (Northeastland), but the main regional center, the village of Kuusamo, is lacking in too many respects to serve as an effective provincial center.

In the southernmost parts of *Pohjanmaa* (= Ostrobothnia = East Bothnia = Finnish Bothnia) there are likewise distinct provincial

entities. *Keski-Pohjanmaa* (Central Finnish Bothnia) emerged as a highly homogeneous concept, though it is situated partly in Oulu lääni and partly in Vaasa lääni. *Etelä-Pohjanmaa* (South Finnish Bothnia), where the term *maakunta* originated as a rough equivalent of the English concept "province", naturally represents a well-established geographical entity. The same may be said of *Svenska Österbotten* (Swedish Ostrobothnia), which by virtue of Swedish being the language predominantly spoken there stands out clearly delimited. It should be pointed out, however, that the functional boundary does not adhere to the language boundary, for the area dominated by the city of Vaasa also includes the westernmost communes of Finnish-speaking *Etelä-Pohjanmaa*. Inasmuch as Seinäjoki, at least up to the present, has been relatively deficiently equipped to serve as a provincial center (Fig. 1), the influence of Vaasa has been felt in the *maakunta* sense throughout the entire area of South Ostrobothnia. *Keski-Suomi* (Central Finland) constitutes a distinct whole.

In the eastern half of middle Finland, only *Pohjois-Karjala* (North Karelia) emerged as nearly distinct a provincial concept as the *maakuntas* of the western half. In *Savo* the separation into North and South *Savo* has for some reason been a deficient development. In *Pohjois-Savo*, however, about 44 per cent of the respondents declared in favor of the name of the contemporary province, but 41 per cent remained loyal to the old, historical *Savo*. In the southern part of the region, only 24 per cent favored the name *Etelä-Savo* while about 50 per cent stuck to *Savo*. This result is in good agreement with *Vilkuna's* (1966, p. 14) view that *Savo* should for the time being be preserved as a single, distinct cultural entity.

Häme appears to be almost equally deficiently divided in the minds of people into separate *maakuntas*. Two quite strongly functional provinces seemed to emerge there — *Pirkanmaa*, or *Tammermaa*, and *Päijät-Häme*; but in every area, including *Kanta-Häme* (= Original Häme), not less than 40 per cent of the respondents voted for Häme, pure and simple. *Pirkanmaa* was known to some 40 per cent of the respondents in the area, but *Päijät-Häme* to only five respondents. The opinion survey further established *Etelä-Karjala* (South Karelia) and *Kymenlaakso* (= Kymi Valley) as names conveying the concept of a distinct regional unit.

In the southern and southwestern part of the country, the *maakuntas* once more emerge as distinctly understood units also in the

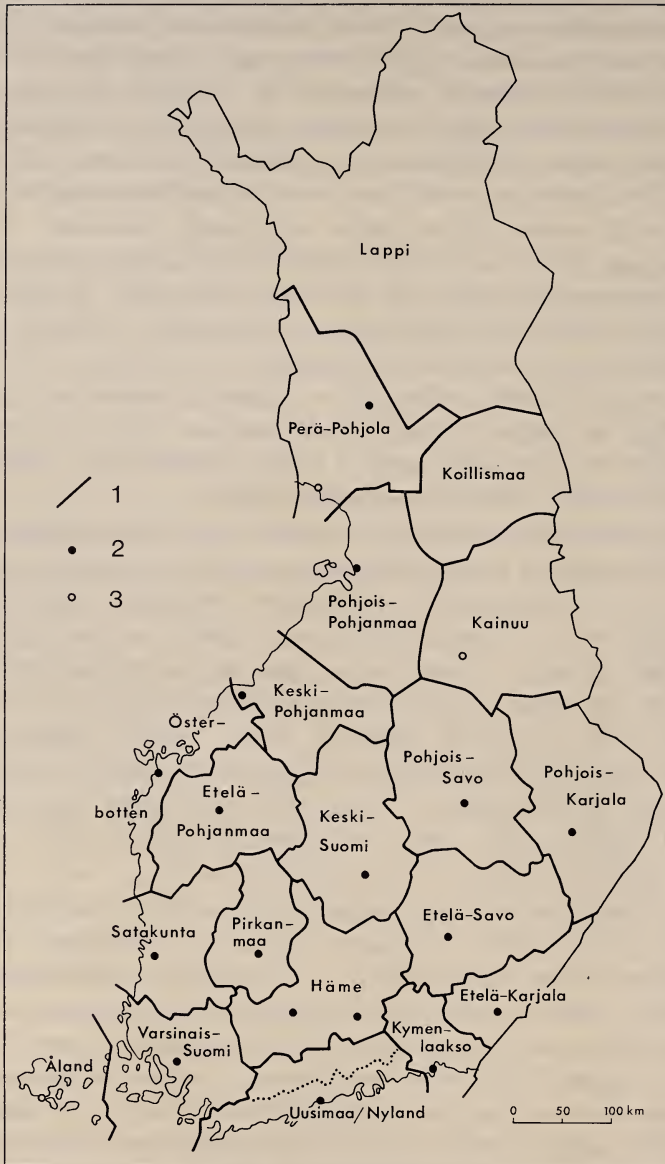


Fig. 2. A generalized representation, drawn from the appended map, of the Finnish provinces in the light of public opinion. 1) Boundary of province as popularly understood. 2) Central place on the provincial level. 3) Lower-level center.

light of public opinion. *Uusimaa* might be divided into the Swedish-speaking coastal region and the Finnish-speaking hinterland; but Helsinki exerts such a powerful unifying influence on both regions that, at least from the functional standpoint, no division is justified. The situation is similar in *Varsinais-Suomi*. *Ahvenanmaa*, or the Åland Islands, emerged conspicuously in the opinion poll, as is only natural, although on account of the weakness of Mariehamn, the capital, the islands do not rise to the level of a functional province. *Satakunta* is one of the most clearly defined provinces in the country.

The questionnaire material might, of course, be utilized as such in establishing the boundaries of the provinces. However, it is exceedingly difficult to draw the boundary in certain places, at least visually. The worst difficulty is the disconnected character of the Savo region. Inasmuch as the drawing of such boundaries probably is of special interest in making comparisons and as quite clearly defined provinces do exist in the minds of people, an effort to do this has been made, too. Twenty "public opinion provinces" emerged (Appendix 1 and Fig. 2).

A comparison made with the functional provinces (Fig. 3) shows that many of the provinces existing as a matter of public opinion are identical to the former. Examples are *Pohjois-Karjala*, *Pohjois-Savo*, *Keski-Suomi* and *Keski-Pohjanmaa*. The greatest exceptions are in the north, where the functional contemporary province of *Oulu* breaks up into three parts: *Pohjois-Pohjanmaa*, *Kainuu* and *Koillismaa*. Further, the functional *maakunta* of *Rovaniemi* splits up according to the opinion poll into two provincial entities, *Lappi* and *Perä-Pohjola*. In the south, again, the extensive conceptual entity of *Häme* is divided into two functional provinces, those of *Hämeenlinna* and *Lahti*. *Satakunta* is a region where the functional province is smaller than the "public opinion province". The effect of the language boundary appears in *Etelä-Pohjanmaa* as a difference between the functional and conceptual boundaries.

The questionnaire material was utilized here also in such a way that the boundaries of the functional provinces (Fig. 4) obtained through the national study were drawn on the map presenting the data compiled. Next the *coefficient of homogeneity* was computed for each region by dividing the sum of the times the most frequently occurring *maakunta* name was mentioned by the sum of the total number of responses received from the province. If only two different



Fig. 3. Comparison of functional and conceptual provinces. 1) Center and boundary of functional province. 2) Boundary of province in the light of public opinion. 3) Lower-level center.

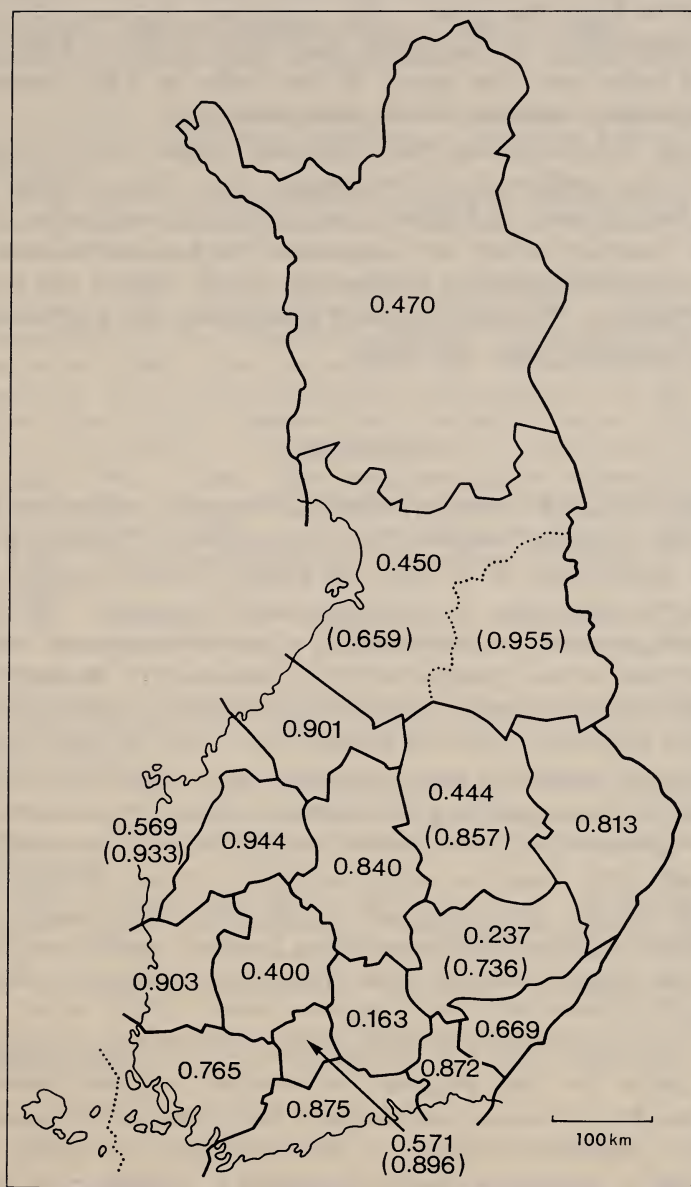


Fig. 4. Degree of homogeneity of the functional provinces obtained in the public opinion survey. See text for detailed discussion.

names happened to be used for the same region, such responses were combined to form the index. For example: *Uusimaa* (Finnish) = *Nyland* (Swedish). In the event the index value is 1.000, all the responses have been the same. If the value is 0.500, one-half the respondents have mentioned the same name, etc.

By way of summarizing the foregoing, a map may be presented on which the coefficients of homogeneity have been marked on the basis of the division of Finland into functional *maakuntas* (Fig. 4). From the numbers it may be judged that the boundaries were drawn with a moderate measure of success also in the light of the provincial survey of opinion. The coefficients of homogeneity are high everywhere except in Lapland, Savo and Häme.

CONCLUSION

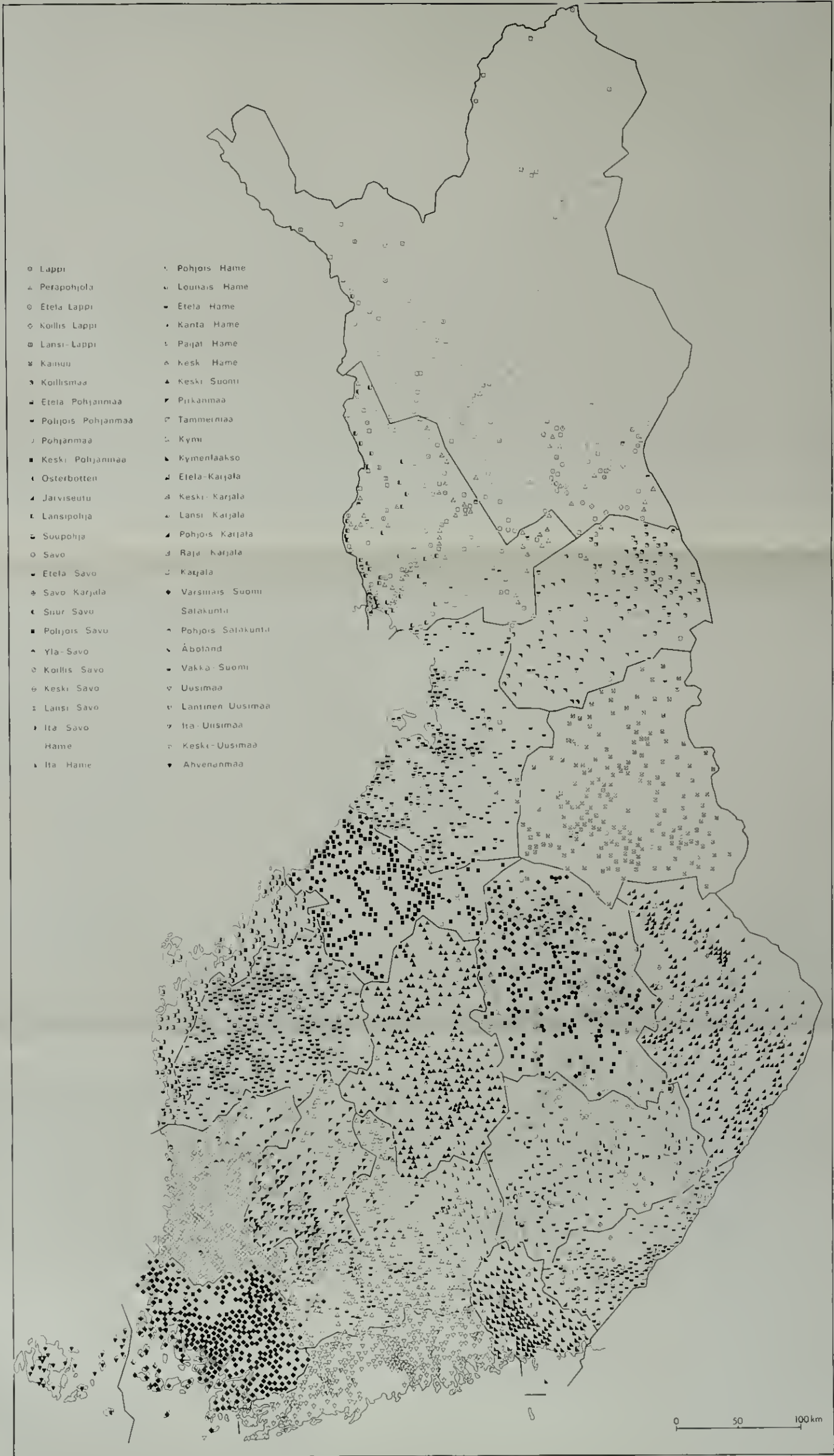
Finally, it might be asked whether the foregoing inquiry has brought to the fore anything whereby the contemporary Finnish provinces could be demarcated in a new and possibly more accurate fashion. The following definition, for instance, might be tested: The present-day Finnish province (= *maakunta*) is a functional regional entity that has developed as the product of a combination of economic, social and administrative activities regulated from central places, there being 17 of these provinces, each one marked by a more or less conspicuous spirit of local solidarity and possessing, as a historical tradition, a distinctive but now vanishing folk culture. Inasmuch as central places and their spheres of influence develop with the advance of urbanization, changes are still bound to occur, evidently, in the number and the boundaries of the provinces, just as the previously clearly defined "castle *läänis*" (= large fiefs ruled from a central castle) and the *maakuntas* that largely evolved from them have changed to "historical provinces".

The *maakuntas* afford a certain basis for dividing Finland into smaller parts for the purposes of detailed regional descriptions. Researchers have to some extent availed themselves of this opportunity. *Atlas över Skärgårds-Finland*, in the compilation of which Helmer Smeds took a prominent hand, represents a realization of the idea by cartographic methods. Smeds' (1948 and 1953) studies of his native province, *Svenska Österbotten*, could serve as a model for similar geographical research projects elsewhere.

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Appendix I. Responses to question: "To what province do you consider your school district to belong?"



POPULATION CHANGE AS AN INDEX OF URBAN FRINGE AND DISPERSAL

With Minnesota as an Example

by

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In a study of the population changes taking place in the area dominated by Duluth during the past three decades, zones of population change could be observed in the area, the extent and character of which varied from one decade to another (Rikkinen 1968 a). Following World War II the distance from Duluth began to be a determining factor of ever-increasing importance in local population change. Fig. 1 presents the curves depicting the mean relative population change as a function of the distance from Duluth for the decades of 1940—50 and 1950—60. The curves in the diagram represent the changes in unincorporated townships. The changes in population are fairly gradual as the distance from the center increases. In the light of the diagram, however, three different zones, corresponding to different types of population development, can be distinguished:

A. Within a radius of about 10 miles around Duluth, the population grew during both decades.

B. Between about 10 and 20 miles, the population decreased in 1940—50 but increased in 1950—60.

C. In the outermost zone, the population decreased during both decades.¹

¹ These types are among those used in Sweden and Finland in analyzing population changes on the basis of statistical curves (Jonasson 1950, pp. 50—53; Jaatinen 1953, p. 29; Oveding 1958, pp. 145—148).

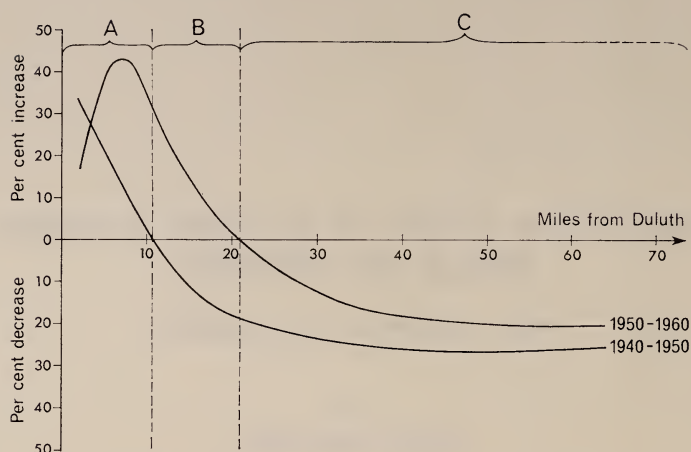


Fig. 1. Curves indicating the average population changes undergone by the townships during the decades of 1940—50 and 1950—60 as a function of the distance from Duluth (after Rikkinen 1968 a, Figs. 6 and 9).

Zone B is interesting insofar as it was involved in the most striking changes of all from one decade to another — the downward trend turned upward. Furthermore, in this zone the difference between relative population changes was the greatest, or some 20 per cent. The places where the population did not decrease on the average in the decade of the '50s are located roughly 20 miles from Duluth, or 10 miles farther than a decade earlier. Zone B may be regarded as representing the latest area to be significantly drawn into the sphere of growing urbanization. To be sure, the expansion of the commuting range can also be seen in Zone C, where, however, the population trend between 1950 and 1960 was only slightly more positive than it had been in the preceding decade.

The sample area of Duluth¹ suggests the desirability of expanding the study to determine the extent to which the patterns of development observed here might be evident over larger regions. The present paper takes in the state of Minnesota as a whole. Since the agricultural population has not grown in any part of the state since World War II, it may be assumed that any increase of population in any locality

¹ The area was chosen in such a way as to reduce the "disturbing" factors to a minimum. Thus, for example, around Duluth there is a broad area lacking large competing centers (*op. cit.*).

is due to the expansion of non-farm settlement. In other words, the hypothesis may be postulated that it is possible to delimitate the urban fringe simply in the light of changes in total population.

REGIONAL PATTERNS OF POPULATION CHANGE

On the basis of the population data provided by the censuses of 1940, 1950 and 1960, it is easy to map the areas where the population trend has corresponded to the zones of population change shown in Figure 1 (U.S. Bureau of the Census 1961). Fig. 2 shows all the Minnesota townships in which the number of inhabitants increased in both the period of 1940—50 and of 1950—60 (Zone A), and Fig. 3 such townships as still experienced a population decline in 1940—50 but grew in size in 1950—60 (Zone B).¹ Fig. 2 also has marked in it the towns of more than 2,500 inhabitants, and both maps show the commuting ranges of the largest centers.

There is a relative scarcity of localities in which the population grew during both decades, and they are limited to the environs of cities (Fig. 2). In the main, the areas that experienced continuous population growth are located in the suburban zones of the Twin Cities and Duluth as well as the mining country of the Iron Range. The sparsely settled area east of Duluth and the Iron Range shows up too conspicuously on the map. The area contains three extensive townships whose population has increased during the past couple of decades — but, in absolute terms, only slightly.

On the other hand, the townships whose population decreased in the decade of 1940—50 but began to grow in 1950—60 comprise both numerically and in terms of area, a much bigger group (Fig. 3). What took place during this ten-year period resulted in veritable “urban sprawl”. Although these areas of growing population might at first

¹ The township is the smallest unincorporated regional unit represented by available population data. It has also been observed that the population trend of incorporated hamlets and villages in recent years has closely resembled that of the areas surrounding them (Rikkinen 1968 a, b). However, in the vicinity of large cities the pattern of population change of the villages exhibits complicated details. For this reason such villages have been left out of this preliminary analysis. Accordingly, primary attention in the present study has been given the areas of growth characterized by scattered urban settlement.



Fig. 2. Townships which experienced population growth in both 1940-50 and 1950-60 (slant lines). — 1) Commuting ranges of the largest centers (after Adams 1964, Fig. 11). 2) Center of over 10,000 population. 3) Center of 2,500-10,000 population. — TCMA = Twin Cities Metropolitan Area.

glance seem to be scattered over the map, certain consistencies can be discerned in their location: 1) A fairly uniform zone surrounds both the Twin Cities and the Iron Range. This observation agrees well with the trend of development revealed by the vicinity of Duluth (Fig. 1). 2) Situated around smaller towns are, in many cases, growth

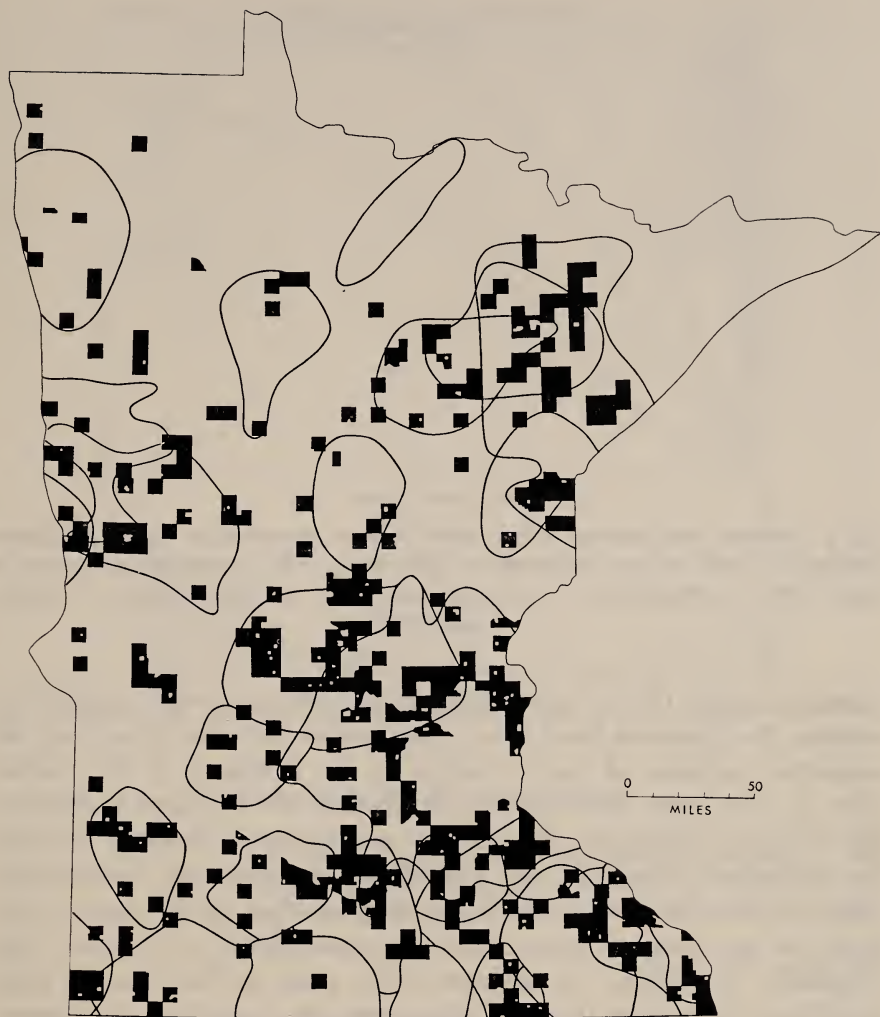


Fig. 3. Townships whose population decreased in 1940—50 but grew in 1950—60. The commuting ranges of the largest centers correspond to those in Fig. 2.

areas consisting of one, two or three townships. 3) Nearly all the areas lie within the commuting range of an urban center of over 10,000 population. Quite a few of the townships are located in the border zone of one or more commuting ranges.

In order to determine in what way the areas representing the last-

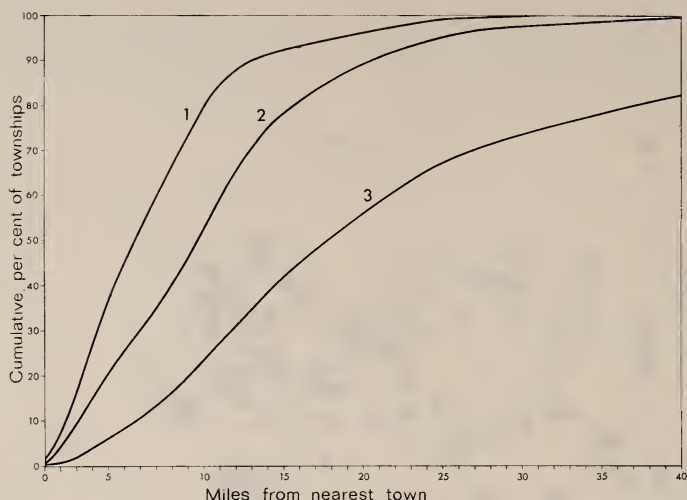


Fig. 4. Distance from nearest urban center of such townships as whose population declined in 1940—50 but increased in 1950—60. — 1) Population of center at least 1,000. 2) Population of center at least 2,500, and 3) population of center at least 10,000.

mentioned type (B) of population change are situated in relation to centers, the distances have been computed as the crow flies from the geometric midpoint of the townships to the boundary of the nearest town of more than one thousand, 2,500 and ten thousand population. The analytical results are given in the accompanying diagram, in which the percentual shares of the townships are presented cumulatively (Fig. 4). It will be seen from the diagram that 80 per cent of the areas lie less than 10 miles from an urban center of at least 1,000 residents. In addition, 79 per cent of the areas lie less than 15 miles and 91 per cent less than 20 miles from the boundary of a center of at least 2,500 population. The great majority of the areas of population growth thus are situated less than 20 miles from a relatively large urban center — i.e., within “normal” commuting range.

The regional division of population trend types A and B proved to be as expected on the basis of the specimen area of Duluth.

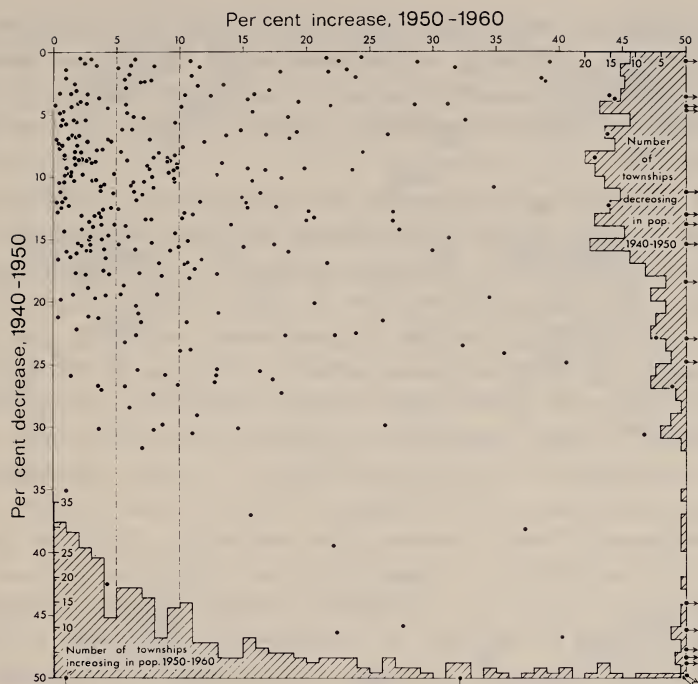


Fig. 5. Relationship between population decline (1940-50) and growth (1950-60).

COMPARISONS AND DISCUSSION

If it is accepted that regionalization is analogous to classification... Classifications should be designed for a specific purpose; they rarely serve two purposes equally well.

Grigg 1967, pp. 485-486

One of the most striking features of the foregoing analysis is probably the tremendous dispersal into the countryside that took place in the last decade and that has been noted in earlier studies to have taken place not only in the United States (e.g., Mather 1963, pp. 1-12; Borchert *et al.* 1964, pp. 1-3) but also in Europe (e.g., Illeris 1967, pp. 146-152). During the present era of the automobile, the structure of cities really differs considerably from the relatively compact structure that prevailed even as late as just before the outbreak of World War II. The study of this "urban region" reveals that many kinds of areal divisions are possible and necessary.

The population trend types A, B and C were differentiated solely on the basis of a growing or declining *trend* during two successive decades. If, in addition, the *amount* of change by taken into account, it is possible to divide the types of population change into subsidiary categories.

Fig. 5 presents, as an example, the amount and correlation of the population changes taking place during the past two decades in the type B areas (where the population declined in 1940—50 but grew in 1950—60). The diagram shows that in 1940—50 the townships underwent a widely varying decline in population, and they are divided fairly evenly into different classes between the 0 and 20 per cent levels. During the 1950—60 decade the increase in population experienced by the majority of these townships was small (0—10 per cent). In the light of the diagram it is extremely difficult to divide population trend type B into sub-types, as the example of Duluth makes evident. Purely on a compromise basis, however, the townships might be classified cumulatively according, for instance, to the population increase of the last decade as follows: 1) Townships whose population growth in 1950—60 was over 10 per cent, 2) townships whose growth in 1950—60 was over 5 per cent, and 3) all the townships of this category.

These sub-types of population trend type B are indicated in the accompanying map (Fig. 6 a, b and c). A visual comparison of the maps reveals that there is a weak positive correlation between the population growth (1950—60) and the size of the nearest centers. Between the population growth and the distance from the centers, however, there is a weak negative correlation, as might have been expected on the basis of the specimen area around Duluth. Thus, for instance, the townships whose population increased in 1950—60 over 10 per cent (Fig. 6 a) are located for the most part around the major cities and closer to them than are the townships of slower growth.

Inasmuch as the population changes appear, therefore, to adhere to the same developmental pattern as in the Duluth area with increasing distance from the centers, it is no wonder that population change types A and B or their sub-types conform closely to other urban regions delimited by means of criteria frequently of quite a complicated nature. Thus, for instance, the urban regions arrived at by the regional division presented in Fig. 6 d (Borchert 1963, pp. 21—26) have many points of contact with, in particular, map 6 b.

Each regional division should be judged on the basis of the connection



Fig. 6 a. 1) Townships whose population increased in both 1940–50 and 1950–60.
2) Townships whose population decreased in 1940–50, but increased in 1950–60 by more than 10 %.

Fig. 6 b. 1) Townships whose population increased in both 1940–50 and 1950–60.
2) Townships whose population decreased in 1940–50, but increased in 1950–60 by more than 5 %.

Fig. 6 c. 1) Townships whose population increased in both 1940–50 and 1950–60.
2) Townships whose population decreased in 1940–50, but increased in 1950–60.

Fig. 6 d. Non-farm townships of Minnesota, 1960 (after Borchert 1963, Fig. 12).
1) "Suburban" and "dense non-farm" townships ("non-farm" = pop./36 sq.mi. area, 250 or more). 2) "Dispersed non-farm" (50 to 249) and "growing part-farm" (less than 50) townships. (Indian settlements and resorts or lakeshore settlements are excluded.)

in which it is used. Thus, one might speak of a practical or of a not very practical regional division. One might speak of a regional division that is applicable only in some individual cases and, on the other hand, of a regional division that has fairly general applications.

The classification presented in the present paper is based wholly on numbers of total population. Thus, in a narrow sense, these data reflect only certain regional features of population changes. Inasmuch as the growth of the population of Minnesota since World War II has taken place only among non-farm groups and as the population changes appear to adhere to a certain consistent pattern determined by the distance of any given community from the urban center, the changes that have occurred in the absolute numbers of inhabitants are highly useful in classifying the urban-rural continuum on a more or less general basis, too.

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MULTIPLE-SCALE CLASSIFICATIONS FOR RURAL SETTLEMENT GEOGRAPHY¹

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A part of the professional inheritance in rural settlement geography is varied objectives and confused terminology. Yet this might be expected after noting that the development of the field has been so long in time, so varied in space, and so much by individuals rather than by organized groups.² At present disorder not only persists but is being augmented. This is evidenced by the great variety of items included in rural settlement bibliographies and is illustrated further by the varying uses of the same terms in modern publications. There is a notable absence of an international classification or of continental maps of rural settlement. Further, it is often clear in current discussions that either the same things are not being talked about or that the terms can be defined only vaguely.³ Thus, there is need for agreement on both the methodology of rural settlement geography as well as the terminology basic to it, especially to accomplish the international comparability towards which all geographers aim. It is suggested that each of these may be accomplished and rural settlement geography refined considerably by the multiple-scale approach to each study and the restriction of terms to each of four different groups of scales.

TERMINOLOGICAL NEEDS

Terminological weaknesses are inherent in rural settlement geography. One reason is that conflicting uses of terms are representative of the struggle in all geography to become scientifically more accurate

and complete. This is difficult when utilizing words employed loosely both in former days of very general geographic description and in present-day ordinary conversation or when using a word which has been translated into one English term from several different foreign-language expressions. Another cause is that geographers are often less cautious with description than with analysis. Further, by overlooking the differences in the scales of source materials workers have used words interchangeably for different geographic considerations. And last, there is the problem of what procedures to employ in both description and analysis.

For these needs and weaknesses some remedies will be realized from three responses. 1) Recognition that only simple agreement on new terms is necessary. 2) Development of a technique which distinguishes objectively between the extent, the pattern of distribution, and the spacing of rural buildings as well as the processes of settling. 3) A limitation of the use of a term to a specific scale of description or analysis. Let us consider each briefly.

Definition of many terms does not or can not depend upon etymology or past usage. Derivations of some of the words needed are insufficient for the professional connotations now required. Several terms presently current have been used so differently during the past century that it would be wiser to discard them than to recast their meanings. Terms are but short-form expressions of ideas. Yet the ideas in rural settlement geography ought not just grow, they need to be shaped. Of course, international comparability depends on employment of the same words the same ways. But without basic origins and repetitive similar use dependence is now simply on agreement as to which words come closest to conveying ideas.

To date there has been little uniformity in geographic description of the form of rural settlement. The subjects have varied greatly. So have the scales of description. Words like "open", "loose", "close", and "disconnected" have been favored, implying certain meanings but not really having them. So a descriptive technique is needed for use with the usual office-type source materials, such as, topographic maps and air photos, as well as the maps prepared for a study.⁴ One profitable guide is first to characterize the rural settlement form of an area according to its cartographic appearance at small scales and then give additional descriptions at larger and larger scales. Usually this proceeding from a general description towards the specific is productive in three

ways: distributional designs which appear or disappear with changes in scales of maps and air photos may be noted, the procedure leads directly to international comparisons, and both readers and researchers are less likely to become entrapped by detail in the initial steps. However, analysis probably is more efficient by the reverse procedure, that of large-scale to small-scale study.

A second guide is to delineate sub-topical differences. In rural settlement geography separate descriptions are desirable for at least two different elements. First is the extent of the area in which rural buildings are present. Generally this is not interpretable from available source materials with scales smaller than 1/500,000 but especially prepared maps of some regions with scales to 1/1,000,000 may be suitable to determine this scattering. Secondly, the technique ought to disclose the geographic pattern of distribution of buildings. This is a description of the shapes or outlines of the various sub-areal arrangements of symbols for buildings; it differs from the inhabited area noted first.

A third guide is to designate measures of the spacing of buildings as well as of the characteristics of individual structures. This is possible by descriptions which include the average maximal and minimal distances between buildings (just as in climatic descriptions average daily or monthly maxima and minima of elements are employed). These distances may be at least three kinds: straight-line separations, those along existing circulation routes, or statistical indices. Then detailed measures of construction may be added to complete the describing of form.

These general needs could be reduced by acceptance or international modification of a suggested multiple-scale analysis and description. The multiplicity includes four stages, each of which should be included in an account of morphology or of rural settling process. The four might be called the regional, sectional, local, and individual approaches. Each is based upon the usual cartographic and photographic source materials (or upon especially prepared maps) available for an area and grouped by empirically estimated scales. Further, description at each scale involves terminology which is usually limited to just that category.

MULTI-SCALE DESCRIPTION OF RURAL SETTLEMENT FORM

The *regional description* is the most general suggested. Any smaller scale study is considered here to be a part of population geography because symbolization in it is by inhabitants, rather than buildings, and because a symbol usually represents a large group instead of one. Regional here means description based upon accompanying maps with scales of about 1/500,000 to 1/200,000 (Table 1).

Although the smallest groups (less than 10—15 buildings) and the single widely-separated buildings are often omitted from published maps at regional scales or are not seen on air photos (by cartographic design or because of the purpose for which a map or photo is executed), the general areal extent of rural settlement usually is interpretable; this is especially so for scales larger than 1/400,000 in a region of discontinuous settlement or 1/300,000 in a continuous settlement region.

To describe extent of settlement the terms “scattered” and “limited” are recommended. In fact, the former might be expanded to “scattered all over” to emphasize that buildings are throughout an area as in Figure 1. By contrast, limited extent denotes that only part of an area has buildings in it, such as, the south-central. This description is dichotomous and there is no intent to include densities in, or shapes of, inhabited portions.

During the past century “dispersed” and “concentrated” have been used by some authors to indicate extent of settlement in a small-scale context. Others have used them to mean spacing in a large-scale sense. These are, of course, two quite different things. Of the two words, dispersed has been used in the most confusing ways. Ordinarily it means scattered throughout or spread widely in an area.⁵ But various geographical applications were so numerous by 1926 that Marguerite Lefèvre tried to coordinate them. To her dispersed meant a scattering of houses all over an area, although she also added a phrase, like “in closed association”, to describe spacing.⁶ She repeated efforts in 1930 to explain dispersed specifically but only two years later Dantin Cereceda called for definition of the word.⁷ These expressions were not heeded and other meanings have been mixed in, such as “... not more than 2 or 3 families living close together”,⁸ and “A pattern of rural settlement, with isolated farms or cottages not grouped in villages or hamlets...”.⁹ These were countered by Jones’ helpful syn-

Table 1. Classes of Geographic Description of Rural Settlement Form
(with respect to Permanently Occupied Residences).

Class	REGIONAL	SECTIONAL	LOCAL	INDIVIDUAL
Scale of Map	1/500,000—1/200,000	1/200,000—1/75,000	1/75,000—1/15,000	1/15,000 and Larger
Descriptive	1. Extent of Rural Settlement a. Scattered (all over) or b. Limited (to part)	2. Distributional Design a. Spots (pattern, spacing, size) b. Lines (pattern, orientation, spacing, length) c. Areas (pattern, shape, size, spacing, density)	4. Multiple Settlement Units a. External spacing (between units of same type, between nearer neighbors) b. Internal patterns (shape and location of central place, location of non-residential buildings, spacing) c. Site specifics (cultural and physical)	6. Horizontal Plan a. Shape b. Size c. Use of space
Categories				7. Vertical Plan a. Shape b. Size c. Type of roof
and		3. Settlement Unit Type		8. Construction Materials a. Type b. Method of assembly
Terms		a. Singles (location, percent of total) b. Multiples (location, percent of total, external shape): Clusters Hamlets Villages	5. Singles a. External spacing (between singles, between nearer neighbors) b. Internal spacing (between residence and associated buildings) c. Site specifics (cultural and physical)	9. Other Detail a. External b. Internal

onymous use of dispersed and scattered.¹⁰ However, we still find mixed and unclear meanings in elementary and advanced works alike.

The term "concentrated" is almost equally confusing. Some usage clearly refers to how closely buildings are spaced, as in a village. Other references as plainly mean limitation geographically. Thus, for both dispersed and concentrated it appears wise to discard them and to substitute "scattered all over" and "limited" in the regional descriptions.

Sectional descriptions are the next more detailed. They are made from maps with scales of about 1/200,000 to 1/75,000. Since the usual published maps commonly show most or all of the single buildings or single-family groups sectional descriptions need to be of two types:

those designating distributional design and those covering the type of settlement unit.

Distributional design usually is more easily described with source materials in the smaller-scale part of this class. There the patterns are often clearer and are divisible into spots, and/or lines, and/or areas (Fig. 2). Modifiers may be added to note whether a pattern is random or regular in appearance, what its dimensions are, the spacings between parts, and what geometric design, if any, is apparent. Of course, a study area might include all three types and, if so, each needs to be designated locationally.

With source materials having the larger scales within this category the settlement unit types can be delineated. It is recommended that the focus of description here be the residence and that there are two types: those occurring singly and those in multiples; the latter are subdivided into clusters, hamlets, and villages. For each, location can be given, then its percentage of the study area's total number of houses, and then, for the multiples, characterizations of their shapes (geometric or statistical indices). The term single refers to those residences, and any associated outbuildings, which occur alone. Inasmuch as alone is not yet defined, international comparison and definition will be possible if all researchers adopt the principle of giving the average minimal spacings of singles as a part of their description. Thus, an account might read "in this section of Spain 18 per cent of the dwellings are singles which are 5—8 miles (8—13 km.) from the nearest neighbor."¹¹

Next is the cluster. This is the real unknown in rural settlement geography. It is a small number of rural buildings, defined here as only dwellings, forming a loose group; some twos and threes are apparent on Figure 2. This category has hardly been recognized by geographers or other social scientists.¹² Yet, the study of clusters and the clustering tendency surely will disclose many elements significant to spacing and will lead to better understanding of the origin of central places.

The third unit is the hamlet. Diversity of definition of it by social scientists is great. One calls it a small group of houses that is too small to be a village and usually has no church,¹³ another suggested that unincorporated hamlets in the United States have a minimum of five buildings with certain maximum spacing and other characteristics,¹⁴ a third recommended a hamlet be a grouping of 2 to 20 buildings,¹⁵ while still another notes that in Latin America a hamlet

(*caserio*) has approximately 20 to 200 people, a large hamlet (*villorio*) 200 to 1000 persons, and that each has other distinguishing characteristics.¹⁶ Many European uses or legends on maps suggest hamlets are small groups of laborers' or farmers' dwellings. Just how hamlets are to be defined now depends on worldwide comparative studies of them as well as of clusters and the next type of settlement unit.

This is the village, as inadequately defined as the others. Many writers distinguish villages by population, others by population and function, and still others by organizational or areal status. How it is to be done is largely arbitrary; more important is that geographers, at least, simply agree to do it the same way on a worldwide basis. For clusters, hamlets, and villages it is recommended that the measures be in numbers of buildings, that the clusters have only residences, that hamlets have a small proportion (perhaps 10—15 per cent) of their buildings in non-residential use, and that villages have both more units and a higher percentage of non-residential structures than hamlets up to a possible total of 200 buildings.

It will be noted that the word isolated has been omitted. The term is too weak and has been used in too many different ways to be of value in an objective scheme. Of Latin origin, rather than geography's many Greek "iso-" (or equal) terms, it is defined partially as "... to keep apart or away from others so as to minimize or wholly reduce any effect on others."¹⁷ Geographers agree that the word refers to spacing and use it repeatedly; yet the term is not included in geographic dictionaries. The questions are: how far apart, how much minimizing, and which effect (i.e., geographic, psychologic, economic)? Further, the present means of communication and circulation make isolated as generally defined probably not applicable in much of the world and certainly not for many areas where geographers have used it.

Further, isolation is not a single thing. Rather, there are degrees of it, divided between regional and local types. But each needs definition.¹⁸ Further work on degrees of isolation will lead to extended and more specific sectional descriptions so that the earlier Spanish description might have added to it "... and each home is within 1—2 miles (1 ½—3 km.) of a local road, within 17 miles (27 km.) of two inter-regional roads, within 11 miles (18 km.) of a local railroad, and more than 20 miles (32 km.) from any other established transport route."¹⁹

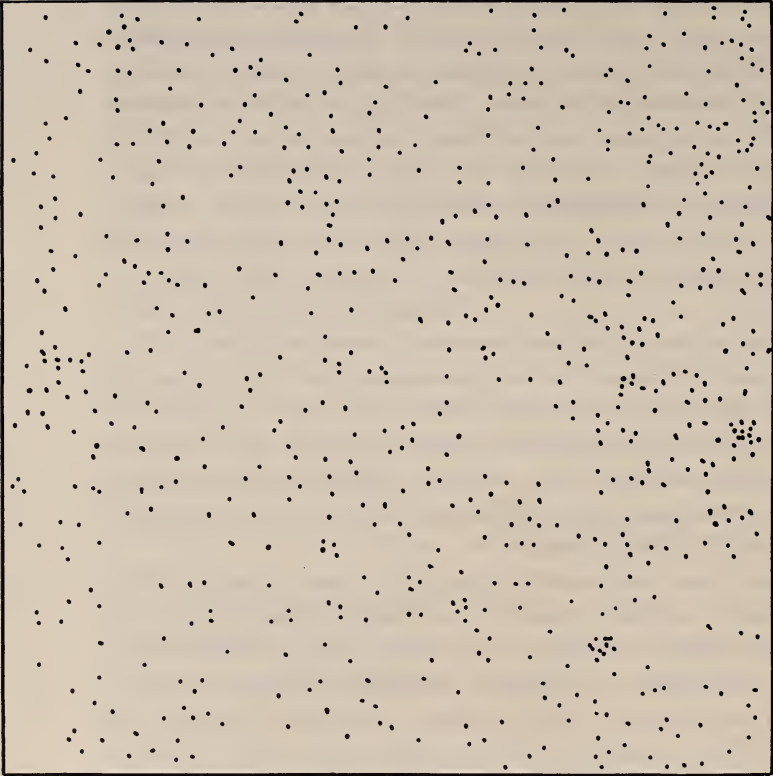


Fig. 1.
REGIONAL
SCALE

$$\frac{1}{320,000}$$

Rural residences
from parts of Litch-
field, Nebraska area
topographic sheets
(1/24,000).

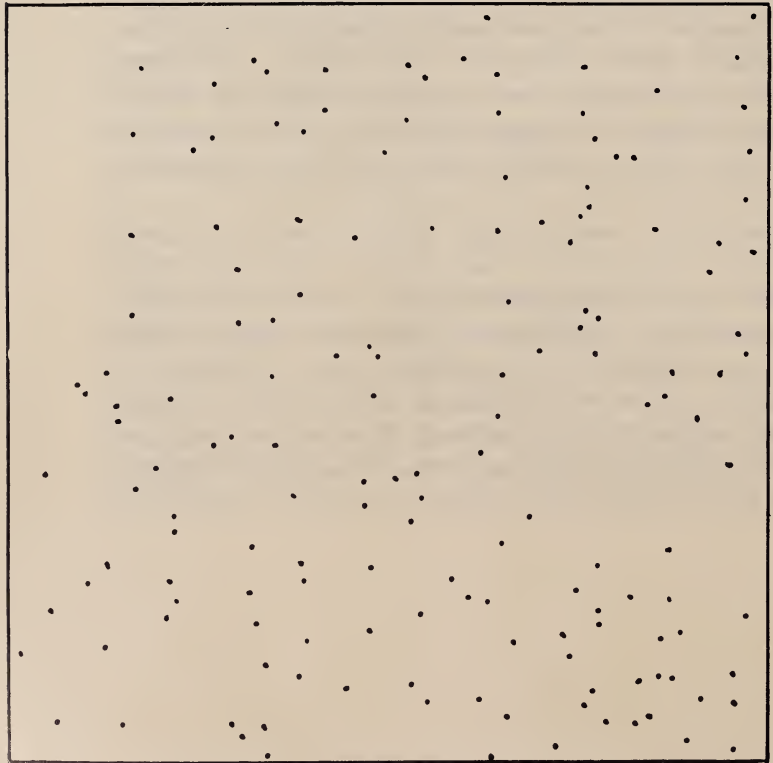


Fig. 2.
SECTIONAL
SCALE

$$\frac{1}{160,000}$$

Rural residences
from parts of Litch-
field, Nebraska area
topographic sheets
(1/24,000). This is
the central part of
Fig. 1.

Fig. 3.
LOCAL
SCALE

$\frac{1}{40,000}$

Rural residences
from part of Litch-
field, Nebraska area
topographic sheets
(1/24,000). This is
the central part of
Fig. 2.

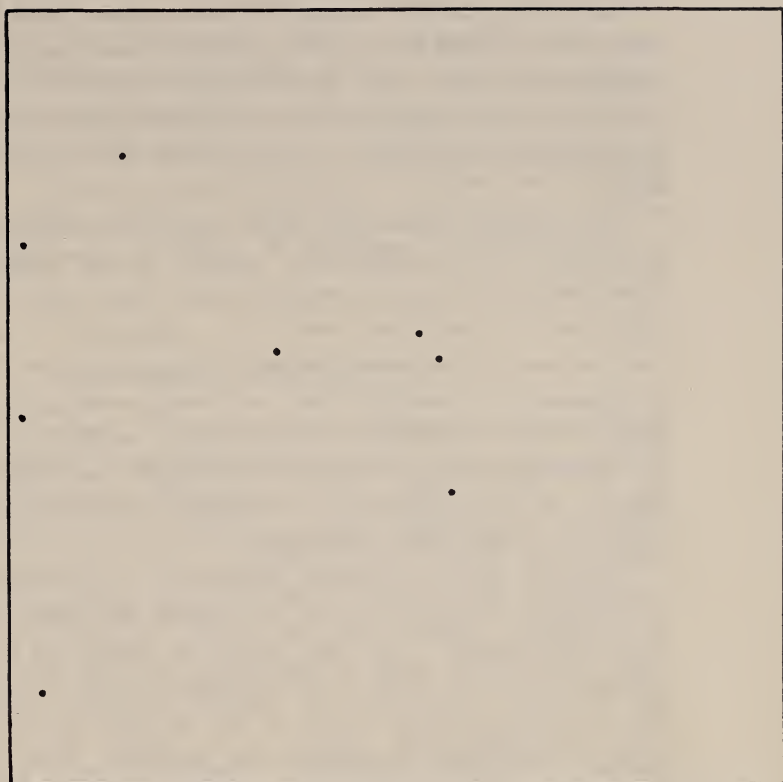
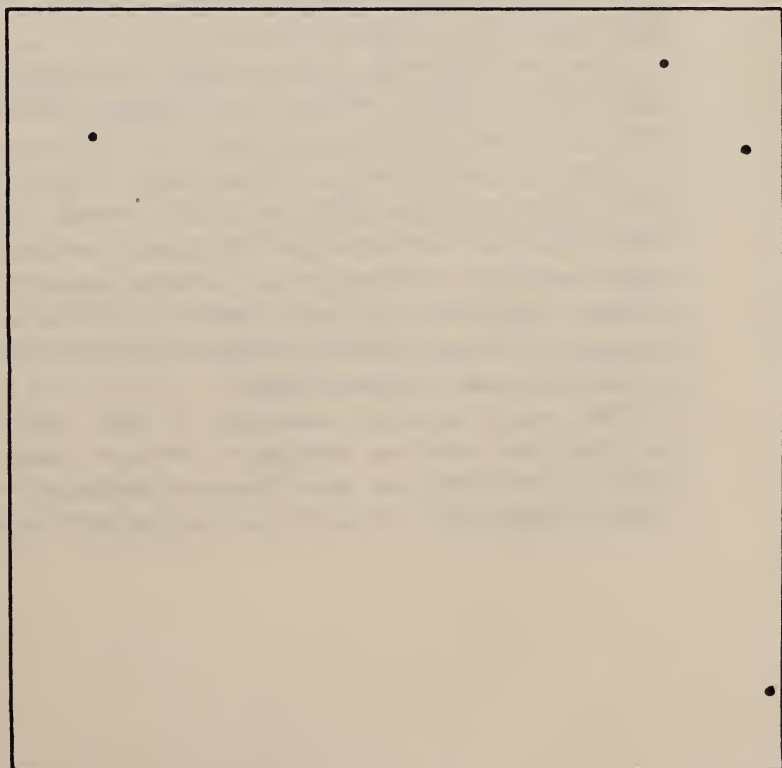


Fig. 4.
INDIVIDUAL
SCALE

$\frac{1}{10,000}$

Rural residences
from part of Litch-
field SW, Nebraska
topographic sheet
(1/24,000). This the
central part of
Fig. 3.



Local description is defined here as that based on maps having scales of 1/75,000 to 1/15,000. With these the residences and other buildings in each type of settlement unit often are distinguishable and, if so, it is possible to discern the internal patterns and to measure the spacings of buildings. If not, maps must be made so as to show both.

The multiple settlement units are more easily described from and illustrated with smaller-scale sources in the local category. Their characterizations may be separated into three parts. External spacings might be first and they need to be designated in at least four ways: that between the representatives of a type (cluster, hamlet, or village) by distances in straight lines and along existing lines of transportation, as well as that between nearest neighbors of whatever type by straight-line and transport-line lengths (although there is a question as to the significance of shorter nearest-neighbor distances in regions of continuous settlement).

Secondly are the internal patterns of the multiples. For villages and hamlets Martiny's work is a guide for description of the shape of central places.²⁰ To that might be added its location as well as delineation of the other building distributional patterns in relation to the central place. Here, too, it will be well to designate the spacing between buildings; in general, this increases from villages to hamlets to clusters but the "breaking points" in these separations are not published as yet, if they are known.

Third are the specific characteristics of the sites of multiples. These may include cultural and physical features which are distinctive as well as explanatory of the selection of the site.

The local description of singles may follow a format similar to that of the multiples. That is, single-to-single distances in straight lines and along most direct transport routes and single-to-nearest-type measurements in the same ways. Internal spacings are the measures between the residence and any associated buildings. And, the characteristics of site are those of specific value in description or analysis of the local-scale settlement form.

The fourth class of accounting of rural settlement form might be called the *individual description*, based on maps with scales larger than 1/15,000. These may show details of spacing between a few selected places or they may reveal the characteristics of a particular building,

that is the three things commonly associated with the term "house type". They are: the horizontal plan of a building to show the shape, size, and use of the overall space and of its parts; the vertical plan to disclose the other dimension of shape and size as well as the architectural type of roof; and the kind of constructional techniques and materials used. Then may come additional external and internal details, such as, position and type of porches, condition of paint or wallpaper, the placement and style of fireplaces and chimneys, or kinds of windows.

A NEBRASKA EXAMPLE

Examples of the value of the multi-scale approach and specified-use terminology abound. An average one is the maps of residences in an area near Litchfield, Nebraska, U.S.A. (Figs. 1—4). At the regional scale the extent of residences may be described as scattered all over. At the sectional scale the distributional design is composed of spots and a few possible areas but the former have a suggestion of linearity (which would be clearly and, we suggest, exaggeratedly both linear and rectangular if roads were a part of settlement geography's description and were shown on the map). Also, at the sectional scale the units appear to be mostly single residences with many small clusters of two or three. At the local scale there appear to be no multiple settlement units to describe (Table 1, item 4) with the possible exception of a cluster of two at the map's center. This is an excellent example of why it is suggested that all settlement units be classified at sectional scales where one's eyes do not move between closely-spaced dots and where comparability with other more widely spaced dwellings is possible (of course, the classification of multiples depends on determined significant spacing and not just optical proximity); the point is particularly important in this part of the U.S.A. where such source materials as topographic maps have scales of 1/24,000 and most of the vertical air photos 1/20,000. At the individual scale the previous patterns are not apparent (unless carried over mentally from other maps or unless the edges of the map influence the observer) but the value of this scale depends on the addition of buildings associated with the residences and on details of plan and construction; descriptions at this scale are likely to be more complete with other illustrations than just the distributional map.

PREVIOUS PORTRAYALS OF FORM

Prior descriptions of the form of rural settlement, for other than villages, are mostly numerical indices. They are largely the work of geographers and primarily refer to an average or hypothetical spacing of individual dwellings. Nearly all of the 27 exponents known to have been published are limited to single-scale considerations. Of special geographical significance, only one is known to have been applied outside the country of origin and only one inside any nation more than once (Table 2).

Table 2. Indices or Measures of Rural Settlement Form.

Author	Date	Area Applied	Formula
Woeikof ²¹	1909	Russia	$K = \frac{P}{H}$ K is index, P is number of inhabitants, H is number of inhabited places.
Kristoffersson ²²	1924	Sweden	50-meter spacing Less than 50 meters between houses is classed as an agglomeration.
Lefèvre ²³	1926	Belgium	Number houses/km ² Classification of 1—10, 11—25, 26—50, 51—100, 101—250, 251—500, 501—1000, 1000+.
Bernard ²⁴	1931	France	$C = \frac{HA}{S^2}$ C is index of concentration, H is number of houses, A is area, S is number of settlements.
Biermann ²⁵	1931	Switzerland	60-meter spacing More than 60 meters between houses is classed as dispersed.
Clozier ²⁶	1931	France	$I = \frac{n}{m}$ I is index, n is number places isolated, m is total number of inhabited places.
Kielczewska ²⁷	1931	Poland	150-meter spacing More than 150 meters between houses is classed as dispersed.
Meynier ²⁸	1931	France	$G = \frac{I}{P}$ G is index of grouping, I is total number of inhabitants, P is total number of inhabited places.
Millet ²⁹	1931	France	300-meter spacing More than 300 meters between houses is classed as dispersed.
Demangeon ³⁰	1933	France	$C = \frac{E \times N}{T}$ C is index of dispersion, E is population of commune minus its chief place, N is number of isolated settlements, T is total population.

- Zierhoffer ³¹ 1934 General $R = \frac{p \times s}{d} \times K$
 R is degree of dispersion, p is average area per dwelling, s is number of house groups in commune, d is total number of inhabitants, K is 0.005.
- Pawloski ³² 1938 Poland $C = \frac{A}{A_s}$ and $MC = \frac{A_s}{S}$
 C is index of concentration, A is 25 km², A_s is area occupied by settlements; MC is mean index of concentration, S is number of settlements.
- Robinson-Barnes ³³ 1940 Midwest U.S.A. and Ontario $D = 1.11 \sqrt{\frac{A}{N}}$
 D is average distance of a farmhouse to nearest six others, A is total area, N is number of farmhouses.
- Debouverie ³⁴ 1943 Belgium $K = \frac{X \times L}{H}$
 K is index of concentration, X is minimum number of dwellings per settlement, L is number of settlement units, H is total number of dwellings in commune.
- Mather ³⁵ 1944 U.S.A. $D = 1.07 \sqrt{\frac{A}{N}}$
 D is average distance of a farmhouse to nearest six others, A is total area, N is number of farmhouses.
- Carol ³⁶ 1946 Switzerland 30 houses per km²
 More than 30 houses per square kilometer is a *Siedlungsfläche*.
- Bergsten ³⁷ 1950 Sweden 200-meter spacing
 Less than 200 meters between residences is classed as grouping.
- Kant ³⁸ 1950 Estonia $X = \frac{1}{M} \sqrt{\frac{A}{D}}$
 X is index of concentration, $\frac{1}{M}$ is map scale, A is area, D is density of habitations.
- Enequist ³⁹ 1951 Sweden 70-meter spacing
 Less than 70 meters between houses is classed as a non-rural settlement.
- Monkhouse ⁴⁰ 1952 General $I = \frac{S}{H}$ also $C = \frac{I}{S}$
 I is index of dispersion, S is number of settlements, H is number of isolated houses. C is index of grouping, I is number of inhabitants, S is number of settlements.
- Houston ⁴¹ 1953 France $C = \frac{S \times N}{T - E}$ (Amended Demangeon)
 C is index of dispersion, S is area of commune, N is number of isolated settlements, T is total population, E is population of commune minus its chief place.
- Clarke-Evans ⁴² 1954 General $R = \frac{\sum r}{N} \bigg/ \frac{1}{2 \sqrt{p}}$
 R is index of departure from random expectation of distribution of dwellings, $\sum r$ is sum of distances to nearest neighbors, N is number of measurements made, p is density of observed distribution (no. of individuals/unit area).

- Tanioka⁴³ 1957 Japan $M = \frac{S \times T}{S \times N}$
 M is index of dispersion, S is area of map sheet (1/50,000 scale), T is per cent of land cultivated, S is average agricultural area worked per family, N is average number of rural houses per village.
- Myklebost⁴⁴ 1960 Norway 50-meter spacing
 Less than 50 meters between houses is classed as an agglomeration (include function; do not apply rule vigorously).
- Stone⁴⁵ 1962 Norden, Nornam $R \text{ or } FZ = Nh + Nr$
 R is region of continuous or discontinuous settlement, FZ is fringe zone in discontinuous settlement region, Nh is pattern of permanent residences within 3 miles along 1-6 major directions from any one permanent residence, Nr is number (1-4) of inter-regional and local routes of transport within 10-20 miles of each permanent residence.
- Inouye⁴⁶ 1964 Japan 50-meter spacing
 Isolated means less than 3 houses within 50 meters of each other, scattered means 3 or more houses less than 50 meters from each other, concentrated means more than half of the houses in a village distributed into one group within 50 meters range, condensed means more than half of the houses in a village centralized into one core.
- Birch⁴⁷ 1967 Midwest U.S.A. $R_1 = \frac{rA}{.5 (A/N)^{-1/2}}$
 R_1 is index of randomness of regularity or agglomeration of farmsteads, rA is the observed mean distance between each point and its nearest neighbor, A is the area, and N is the number of points.

Most single indices of so complex a pattern as the distribution of rural buildings have weaknesses. One number could hardly be expected to reflect all variations possible in distribution. Further, most of the formulae include one or more elements which are undefined, or for which data can be obtained only locally by field work or from unique censal enumerations, or which appear to be arbitrary decisions about spacing. Also, many of the measures are centered on regions of continuous settlement where a density figure might have some value but few of the indices are suitable for regions of discontinuous settlement where densities are useless. It is suggested that the understanding and strengthening of these indices would be furthered by multi-scale considerations as well as the adoption of limited-use terminology.

MULTI-SCALE DESCRIPTION OF RURAL SETTLING PROCESS

The need for comparable descriptive techniques for the processes of settling and abandoning is even greater than for form. Usually an account of process is in chronological terms rather than areal.

When the latter it is often a large-scale consideration or subjective.⁴⁸ Further, the difficulty of understanding commonly is increased by a lack of distinction between rural settlement morphology and rural settling process.

In general, these weaknesses reflect poor definition of the object of study, professional timidity, incomplete field work, or the impotence of single-scale classifications. Process often has been treated as an historical curiosity rather than as a tool for planning the future. Commonly people are said to be too complex for transfers of processes to be made areally but we challenge this. Too often people's actions appear insolubly complex because they are interpreted by a person foreign to the area of study rather than being determined through complete and dependable interrogation of the settlers themselves by one quite familiar with the area. Further, too frequently the basic problem is scale of observation versus scale of description.

One possible multi-scale classification of the rural settling process parallels that for settlement form. Regional, sectional, local, and individual descriptions may be made with the smaller limits of each respectively 1/500,000, 1/200,000, 1/75,000, and 1/15,000. Categories in each of the first three might be advancing, stable, and retreating, defined in terms of the number of rural residences and related buildings constructed and occupied, or abandoned (in the given period of time) to show significant or no changes of an areal boundary at each of the three scales. At the individual scales the categories might be enlarging, reducing, or no change of the size.

A lack of measures of process has delayed study of the actions themselves. Unlike some of the more sophisticated measures of form, settling and abandoning usually have been gauged in the simplest ways. Either buildings are present or absent, they are used or unused, land is cleared or uncleared, and roads are present or absent. Classifications have been dichotomous — unlike the elements being studied. Considerable additional study is needed to determine direct and indirect indicators of rural settling and abandoning. Distinction is required between seasonal and year-round occupancy as well as between seasonal disuse, unoccupied, and abandoned. The normal life and death on a landscape needs definition.⁴⁹ Decision-making by settlers requires analysis.⁵⁰ The psychological and sociological characteristics of individual versus group action requires research; and a host of other cultural, as well as physical, elements of the landscape demand equal study.

Each necessitates, first, the delineation of measures and until this is done the real processes of how settling and abandoning occur will remain largely unknown.

METHODS OF ANALYSIS VERSUS DESCRIPTION

Generally it is more efficient to analyze form and process in the opposite order of that used for description. That is, to deduce by proceeding from larger scales to the smaller. This is because a researcher probably will have to create all of the multi-scale maps of an area under study.

In the first place, few are the areas for which basic data are available. Only a small part of the world is covered by up-to-date topographic maps or air photos showing accurately and completely the residences and other rural buildings. Then a researcher needs to determine if the residences are occupied. Therefore, one is likely to be dependent upon large-scale air photos or field observation at the start of a study (even after we begin obtaining small-scale remotely sensed data from satellites).

Second, differently scaled maps already prepared for an area are likely to be notcomparable. Either they will have been done by different cartographers employing various methods of depicting detail or the maps are likely to have been made at unrelated times, making them unsuitable for comparison of either form or process. Study of three maps of the Lake Constance area, Switzerland, for example, disclosed a 61 % loss in number of dwellings between 1/25,000 and 1/100,000 maps and an 86 % loss between the 1/25,000 and 1/200,000 maps. This decrease, even in such a region of continuous settlement, is unnecessary but normal.

Analysis starting with the large-scale study has a major disadvantage. Often the researcher is entrapped in detail either because of the massiveness of effort required to make the initial inventory or because it is a human tendency to think more readily in larger-scale measurements. At least entrapment appears to have occurred in much of the geographical literature on rural settlement form.⁵¹ And, the problem is equally great in the analysis of rural settling process.

Often the multiplicity of approach has been attempted by combinations of words and maps. Usually they are incomplete. Many descriptions of form and process have been presented by maps at a

local scale and words at a regional scale. Too few successfully demonstrate connection. Seldom is a reader aware of whether detail simply disappears with decrease of scale or new patterns become dominant.⁵²

Just how either form or process is to be analyzed is variable. Analysis is a creative technique which is dependent upon the ability and objective of a researcher as well as the completeness and accuracy of the basic data in use. One may go from large-scale to small-scale considerations or the reverse; or no orderly progression may be advisable in order to emphasize relationships at one scale.⁵³ The important point is that all scales be used in an analysis just as all of the elements of a landscape (e.g., roads, soils, water, race) are employed to explain why the residences are where they are. However, when the explanation is clear it is suggested that the presentation of the description and interpretation of either form or process is more readily understood when done from small-scale to large-scale concepts.

SUMMATION

When the existing literature on rural settlement morphology and rural settling process is reviewed it is clear that descriptions and analyses usually are at only one scale in any one reference.⁵⁴ Further, the scale is often a large one and commonly leads to more detail rather than to generalizations. Or, small-scale generalizations are illustrated by large-scale observations with no proof of progression in intermediate steps. One evidence of the problem of scale consideration is the absence of any map of the rural settlement form of a major sub-continental area prepared by one author and the existence of only two (of Europe) compiled by one person from the works of many.⁵⁵ Maps of rural process are equally scanty in number.

Multi-scale consideration has been recognized as very significant to all geographic research for many years. Yet, most recognition has been indirect. James showed it by noting that different objectives are served by studies at small, intermediate, and large scales.⁵⁶ In 1954 a group of geographers wrote "The general neglect of the meaning of differences of scale or degree of generalization in studies of areal differentiation is a lacuna in geographic thinking.... Every kind of region.... can be organized in a hierarchy of ranks ranging from those with the least degree of generalization to those with the greatest degree

of generalization."⁵⁷ This might be interpreted as an indirect way of calling for differently-scaled work in the same area. The four-class division suggested by the committee was based on mapping scales of larger than 1/50,000, of 1/50,000—1/250,000, of 1/250,000—1/5,000,000, and of smaller than 1/5,000,000.⁵⁸ Three authors wrote later "Every change in scale will bring about the statement of a new problem, and there is no basis for assuming that associations existing at one scale will also exist at another."⁵⁹ Another individual observed "... the scale of an investigation affects both its subject and its conclusions."⁶⁰ And quite recently attention was directed to several multi-scale approaches drawn up since 1916 with the concluding thought being "It is clear that open recognition of the problem of working within a scale continuum clarifies some problems and raises others."⁶¹

In an analysis of new rural settling experiences in Norden the geographical gaps in total rural settlement analysis became clear.⁶² To fill these blanks the suggestion is made here that a description and analysis of rural settlement form or rural settling process should include several parts to be complete and internationally comparable. These are consecutively arranged from general portrayal to more and more specific accounts through four classes of scales called regional, sectional, local, and individual. This requires the use of at least four differently scaled source materials; but seven or eight differently scaled maps and air photos may actually be necessary (and if they are not available we must make or procure them!). In addition, the procedure calls for agreement on the use of certain terms, and the abandonment of others, as well as the limitation of these words to specific scale classes.⁶³ With this accord we can go on to enrichment of the studies upon which this topic is based in order eventually to develop international classifications in rural settlement geography. Thus will all geography be improved.

FOOTNOTES

¹ Several of the ideas presented herein were at least partly developed during long and hard debates on many pleasant occasions between 1955 and 1960 with Professor Helmer Smeds, to whom this work is dedicated. It is with deep humility that I pay homage to a great mind, a stimulating person, and a true friend and colleague whose endless aid and encouragement brought me to considerations of rural settlement geography that would have gone unrecognized otherwise.

² K. H. Stone, *The Development of a Focus for the Geography of Settlement, Economic Geography*, v. 41, 1955, pp. 346—355.

³ An excellent example is the term settlement itself, a part of whose definition is »Any form of human habitation, usually implying more than one house, though some would include a single isolated building....» from F. J. Monkhouse, *A Dictionary of Geography*, Chicago, 1935, p. 278. This is one of a vast number of examples which could be cited to support what James has described so concisely with »But more often the misuse of words results from lack of attention», in P. E. James, *On the Origin and Persistence of Error in Geography*, *Annals of the Association of American Geographers*, v. 57, 1967, pp. 1—24, quotation from p. 6.

⁴ Observation in the field is essential, of course. We assume that most study of rural settlement form will begin with maps and air photos and will be augmented by ground photos, statistics, and documentary data at all stages of the research.

⁵ P. B. Gove (ed.) *Webster's Third New International Dictionary*, Springfield, Mass., 1961, p. 653.

⁶ M. A. Lefèvre, *L'Habitat Rural en Belgique*, Liège, 1926, especially pp. 9—14; M. A. Lefèvre, *Classification generale des types d'habitat*, *Second Report of the Commission on Types of Rural Habitat*, Florence, Italy, 1930, pp. 70—75.

⁷ J. Dantin Cereceda, *Estado Presente de la Cuestion del »Habitat Rural*», *Boletin de la Sociedad Geografica Nacional*, 1932, pp. 25—34.

⁸ M. Wolfe, *Rural Settlement Patterns and Social Change in Latin America*, *Latin American Research Review*, v. 1, No. 2, 1936, pp. 5—50, ref. on p. 13.

⁹ Monkhouse, *op.cit.*, p. 98.

¹⁰ E. Jones, *Human Geography*, London, 1965, especially pp. 114—140.

¹¹ Such comparison has been started in J. R. Bohland, *A Method for Differentiating Single Dwellings and Group Settlement as Exemplified by European Settlement*, paper read at the S. E. Divisional meetings of the Association of American Geographers, November, 1967, Gainesville, Florida.

¹² One study which discloses the value of research on clusters is F. J. McCutchen, *Towards a Geographic Definition of Dispersed Rural Settlement: A Comparison of the Lugo-Leon Provinces of Northwest Spain*, 1965, 8 pp., unpublished manuscript, University of Georgia, 1966.

¹³ Monkhouse, *op.cit.*, p. 152.

¹⁴ G. T. Trewartha, *The Unincorporated Hamlet: One Element of the American Settlement Fabric*, *Annals of the Association of American Geographers*, v. 33, 1943, pp. 32—81.

¹⁵ G. Schwarz, *Allgemeine Siedlungsgeographie*, Berlin, 2nd edition, 1961, pp. 78—83.

¹⁶ Wolfe, *op.cit.*, p. 13.

¹⁷ Gove, *op.cit.*, p. 1199.

¹⁸ An example is available in K. H. Stone, *Geographic Aspects of Planning for New Rural Settling in the Free World's Northern Lands* in S. B. Cohen (ed.), *Problems and Trends in American Geography*, 1967, pp. 221—238, especially pp. 222—225.

¹⁹ A sociologist made a start with a 16-element system of measuring isolation in H. A. Aurbach, *A Guttman Scale for Measuring Isolation*, *Rural Sociology*,

v. 20, 1955, pp. 142—145. Unfortunately there is no record of the study having been revised and reapplied to the original study area of Kentucky or anywhere else.

²⁰ R. Martiny, Die Grundrissgestaltung der deutschen Siedlungen, *Petermann's Mitteilungen Ergänzungsheft*, Nr. 197, Ergänzungsband Nr. 43, Gotha, 1928.

²¹ A. Woeikof, Le groupement de la population rurale en Russie, *Annales de Geographie*, v. 18, 1909, pp. 13—23.

²² A. Kristoffersson, *Landskapsbildens förändringar i norra och östra delen av Färs härad*, Lund, 1924, p. 141.

²³ M. A. Lefèvre, L'Habitat Rural..., *op.cit.*, p. 114.

²⁴ J. Bernard, Une formule pour la cartographie de l'habitat rural avec application au département de l'Yonne, *Comptes Rendu C.I.G.*, Paris, 1931, v. III, pp. 108—117, (1934).

²⁵ C. Biermann, L'Habitat rural en suisse, *Comptes Rendu C.I.G.*, Paris, 1931, v. III, pp. 17—32 (1934).

²⁶ R. Clozier, L'Habitat rural de la posnanie, *Comptes Rendu C.I.G.*, Paris, 1931, v. III, pp. 134—149, (1934).

²⁷ M. Kielczewska, L'Habitat rural de la posnanie, *Comptes Rendu C.I.G.*, Paris, 1931, v. III, pp. 250—256, (1934).

²⁸ A. Meynier, L'Habitat rural dans le Ségala, *Comptes Rendu C.I.G.*, Paris, 1931, v. III, pp. 99—102, (1934).

²⁹ G. Millet, L'Habitat rural dans la region meusienne, *Comptes Rendu C.I.G.*, Paris, 1931, v. III, pp. 47—60, (1934).

³⁰ A. Demangeon, Une carte de l'habitat, *Annales de Geographie*, v. 42, 1933, pp. 225—232. The system was applied to the whole country in the Comité National de Geographie, *Atlas de France*, Paris, 1938, Plate 80. See also A. Allix, Examen critique de la methode de representation de l'habitat rural par A. Demangeon, *Comptes Rendu C.I.G.*, Varsovie, 1934, v. III, pp. 425—428.

³¹ A. Zierhoffer, Sur une formule servant à exprimer la dispersion et la concentration absolue de l'habitat rural, *Comptes Rendu C.I.G.*, Varsovie, 1934, v. III, pp. 410—415.

³² S. Pawloski, Encore une méthode de représentation cartographique general de l'habitat rural, *Comptes Rendu C.I.G.*, Amsterdam, 1938, v. II, pp. 129—130.

³³ A. H. Robinson and J. A. Barnes, A New Method for the Representation of Dispersed Rural Population, *Geographical Review*, v. 30, 1940, pp. 134—137.

³⁴ A. H. Debouverie, Une Methode a base numerique pour la cartographie de l'habitat... Belgique, *Bulletin de Société Belge d'Etudes Géographiques*, v. 13, 1943, pp. 146—196.

³⁵ E. C. Mather, A Linear-Distance Map of Farm Population in the U. S., *Annals of the Association of American Geographers*, v. 34, 1944, pp. 173—180.

³⁶ H. Carol, Begleittext zur wirtschaftsgeographischen Atlas der Schweiz, *Geographica Helvetica*, v. I, 1946, p. 41.

³⁷ K. E. Bergsten, Agglomereringstendensen inom svensk bebyggelse, *Svensk Geografisk Årbok*, 1950, p. 46.

³⁸ E. Kant, Quelques problèmes concernant la représentation de la densité des habitations rurales. Exemples pris en Estonie, *Lund Studies in Geography, Series B: Human Geography*; No. 2, Lund, 1950, pp. 1—9.

- ³⁹ G. Enequist, *Vad är en tätort? Tätorten och umland*, Lund, 1951, pp. 5—15.
- ⁴⁰ Monkhouse, *op. cit.*, pp. 362 and 364—365.
- ⁴¹ J. M. Houston, *A Social Geography of Europe*, 1961, p. 83.
- ⁴² P. J. Clark and F. C. Evans, Distance to Nearest Neighbor as a Measure of Spatial Relationship in Population, *Ecology*, v. 35, 1954, pp. 445—453.
- ⁴³ T. Tanioka, Différenciation régionale des types de l'habitat rural au Japon, *Proceedings of International Geographical Union Conference in Japan, 1957*, Tokyo, pp. 503—512, (1959).
- ⁴⁴ H. Myklebost, *Norges tettbygde steder, 1875—1950*, Oslo, 1960, pp. 39 and 365.
- ⁴⁵ K. H. Stone, Swedish Fringes of Settlement, *Annals of the Association of American Geographers*, v. 52, 1962, p. 374.
- ⁴⁶ S. Inouye, Settlement Measurement in Japan, *Abstracts of Papers, 20th International Geographical Congress*, London, 1964, p. 308.
- ⁴⁷ B. P. Birch, The Measurement of Dispersed Patterns of Settlement, *Tijdschrift voor Economische en Sociale Geografie*, v. 58, 1937, pp. 68—75.
- ⁴⁸ K. H. Stone, Human Geographic Research in the North American Northern Lands, *Arctic*, v. 7, 1954, pp. 209—223.
- ⁴⁹ A settled landscape is like a group of people: A home is vacated (a person dies) and another home is built (a person is born). Each is a normal increase/decrease relationship rather than a signal of significant settling or population change.
- ⁵⁰ J. Wolpert, The Decision Process in Spatial Context, *Annals of the Association of American Geographers*, v. 54, 1964, pp. 537—558.
- ⁵¹ An outstanding example to the contrary and on the order of the approach sponsored herein is R. C. Eidt, Japanese Agricultural Colonization: A New Attempt at Land Opening in Argentina, *Economic Geography*, v. 44, 1938, pp. 1—20.
- ⁵² Could not the same be said for so many of our elementary geographical textbooks?
- ⁵³ K. H. Stone, Scale, Scale, Scale? *Economic Geography*, v. 44, April, 1938, Guest Editorial.
- ⁵⁴ An interesting comment related to geographical research in general is »...most geographic studies in which area differences are identified and plotted on maps fall into two widely separated scale ranges. First,...between 1/10,000 and 1/62,500... In contrast, 1/3,000,000 or smaller.» P. E. James, Toward Further Understanding of the Regional Concept, *Annals of the Association of American Geographers*, v. 42, 1952, pp. 195—222, Quotation from p. 206.
- ⁵⁵ Houston, *op.cit.*, Fig. 16 (p. 103) and Fig. 20 (p. 127).
- ⁵⁶ James, *op.cit.*, pp. 208—211.
- ⁵⁷ D. Whittlesey, The Regional Concept and the Regional Method in P. E. James and C. F. Jones (eds.) *American Geography, Inventory and Prospect*, Syracuse, N. Y., 1954, pp. 19—68, quotation from p. 47. Although I was a member of the committee which recorded this idea I do not recall any specification that the heirarchy was clearly recognizable by differently scaled studies of the same area; however, it is clear now that at least some of us recognized the point subconsciously.
- ⁵⁸ *ibid.*, pp. 48—51.

⁵⁹ H. H. McCarty, J. C. Hook, and D. S. Knos, The Measurement of Association in Industrial Geography, *University of Iowa, Department of Geography Report 1*, Iowa City, 1956, p. 16.

⁶⁰ J. L. M. Gulley, The Turnerian Frontier, *Tijdschrift voor Economische en Sociale Geographie*, v. 50, 1959, pp. 65—72 and 81—91, quotation from p. 89.

⁶¹ P. Haggett, Scale Components in Geographical Problems in R. J. Chorley and P. Haggett (eds.), *Frontiers in Geographical Teaching*, London, 1965, pp. 164—185, the approaches noted on pp. 171—172 and the quotation from p. 183.

⁶² K. H. Stone, *High Latitude Fringes of Settlement*, Final Report under Office of Naval Research Contract Nonr 1202(05), Athens, Georgia, 1967, mimeo.

⁶³ As James has said, *op.cit.*, On the Origin..., p. 6 »Clearly the popular vocabulary changes through misuse, and language grows 'like a language should'. But in communication among scholars such errors would seem to be inexcusable.» This statement and so many others in this perceptive article are so descriptive and analytical of the weaknesses of present-day rural settlement geography that the study of it is strongly recommended to all who aspire to do serious work in the topic.

DER HANDEL MIT LÄNDLICHEN ERZEUGNISSEN IM REGIERUNGSBEZIRK OULU UND IN DEN ANGRENZENDEN GEBIETEN

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In meiner Untersuchung "Oulun läänin keskusten vaikutusalueet" (Die Einflussgebiete der zentralen Orte im Regierungsbezirk Oulu; Svento 1967) habe ich die Einflussgebiete der zentralen Orte aufgrund des Handels mit ländlichen Erzeugnissen, der Versorgung und der Dienstleistungen bestimmt. Das untersuchte Gebiet umfasste den Regierungsbezirk Oulu und ausserdem einige südliche Gemeinden des Regierungsbezirkes Lappland sowie nördliche Grenzgemeinden der Regierungsbezirke Vaasa und Kuopio (Karte 1). Im folgenden seien einige Charakteristika der Sammelgebiete der zentralen Orte für ländliche Erzeugnisse im untersuchten Gebiet dargestellt. Die Angaben beruhen auf einer Befragung bezüglich der Jahre 1965—66. Die Befragung richtete sich an Personen, die von den Gemeindeverwaltungen empfohlen worden waren. Antworten gingen aus 868 Schulbezirken ein (Beantwortung zu 94,7 %). Auf die Befragung bezüglich der Geschäfte antworteten alle 60 genossenschaftlichen Geschäfte des untersuchten Gebietes und 200 der privaten Kaufleute auf dem Lande, die zu 89,3 % antworteten.

Bei der Darstellung des Handels mit ländlichen Erzeugnissen werden der Verkauf direkt aus dem Betrieb und der Verkauf durch Vermittler getrennt berücksichtigt. Ländliche Erzeugnisse werden ja direkt aus den Betrieben in die Zentren gebracht oder geliefert. Andererseits verkaufen die Landwirte ihre Erzeugnisse auch an örtliche Geschäfte oder an Einkäufer, die sie dann in die Zentren vermitteln.

Die funktionellen Gebiete des Regierungsbezirkes Oulu sind nach diesen beiden Hauptprinzipien bestimmt. Durch die Erfassung des aus den Betrieben direkt erfolgenden Verkaufes erhält man die Betriebsareale, während aufgrund des durch Vermittler erfolgenden Verkaufes die Vermittlungsareale bestimmt sind. Zusammen bilden sie das Sammelgebiet des zentralen Ortes für ländliche Erzeugnisse.

J. G. Granö hat im Handbuch der Geographie Finnlands, wo er die Besiedlung und die geographischen Provinzen behandelt, die Grenze Kulturfinnlands gegen Naturfinnland bestimmt (Granö 1951, S. 302, 303, 328, 374, 379, 388, 389 und 391). Hustich hat Finnland in drei Grosswirtschaftsgebiete eingeteilt: das industrialisierte Finnland, die Übergangszone und "Rand-Finnland". Die Grenze zwischen der Übergangszone und "Rand-Finnland" fällt ziemlich genau mit Granös Grenze zwischen Kulturfinnland und Naturfinnland zusammen (Hustich 1960, S. 130—132). Auch Aario teilt Finnland in die beiden Hauptgebiete Kulturfinnland und Naturfinnland (Aario 1966, S. 212, 213). Die Grenze zwischen den nach Aario zu Naturfinnland gehörenden geographischen Gebiete und den zu Kulturfinnland gehörenden fällt ungefähr mit den obengenannten zusammen. Auf diese Grenze zwischen Kulturfinnland und Naturfinnland sind die obigen Forscher aufgrund von naturgeographischen und besonders siedlungs- und wirtschaftsgeographischen Kriterien gekommen. Der Übergang von einem Gebiet zum anderen erfolgt natürlich sukzessiv. Die Gebiete lassen sich jedoch verallgemeinernd durch eine Grenzlinie voneinander trennen. Die Grenze zwischen Kulturfinnland und Naturfinnland im untersuchten Gebiet geht aus Karte 1 hervor.

Im untersuchten Gebiet wirkten als Sammler von ländlichen Erzeugnissen folgende Städte und Marktflecken: Oulu (VI), Kemi (V), Rovaniemi (V), Kokkola (V), Kajaani (V), Iisalmi (IV), Raahe (IV), Ylivieska (IV) und Kemijärvi (IV). Dazu kamen die Flecken der Zentrumsklasse IV: Kuusamo, Oulainen, Haapajärvi, Kuhmo, Kalajoki, Nivala, Sotkamo, Haapavesi, Muhos, alles Kirchdörfer, sowie Ämmänsaari (Karten 1, 12, 13). Die Flecken der Zentrumsklasse II und III, die als Zentrum auf ihre Umgebung wirken, sind aus der Karte 14 ersichtlich. Die Zentrumsklassifizierung folgt der Untersuchung "Oulun läänin keskusten järjestelmä" (Die Ordnung der zentralen Orte im Regierungsbezirk Oulu) von Hilikka Pikkarainen. Nach ihr gibt es im Regierungsbezirk Oulu sechs Zentrumsklassen: I = Dorf, II = Dienst-

leistungsdorf, III = zentrales Dorf, IV = Gebietszentrum, V = Provinzzentrum und VI = Hauptzentrum (Pikkarainen 1967, S. 85—91).

In den Karten zum Handel mit landwirtschaftlichen Erzeugnissen sind der Deutlichkeit halber nur die Sammelgebiete der Städte und Marktflecken berücksichtigt.

Getreide (Karte 2). Der ganze zu Naturfinnland gehörige Teil des untersuchten Gebietes ist autarkes Gebiet (Erzeugnisse werden nach Städten und Marktflecken überhaupt nicht gebracht), ausgenommen einige kleine zerstreute Gebiete. Die Vermittlungsareale von Oulu und Ylivieska sind bedeutend grösser als ihre Betriebsareale.

In dem zu Kulturfinnland gehörigen Teil des untersuchten Gebietes beträgt der Anteil der Äcker 12,3 % und in dem zu Naturfinnland gehörigen Teil 3,1 %. Die Anbaufläche der Getreidepflanzen macht in dem zu Kulturfinnland gehörigen Teil des untersuchten Gebietes 26,3 % der Ackerfläche aus und in dem zu Naturfinnland gehörigen Teil 14,8 %. Der Anteil von Winter- und Sommerweizen sowie Roggen beträgt entsprechend 3,4 % und 0,6 % (STV 1960, SVT 1962, III: 54). Der Anteil der Getreidepflanzen und besonders des eigentlichen Brotgetreides an der Ackerfläche nimmt also in dem zu Naturfinnland gehörigen Teil des untersuchten Gebietes stark ab, was für seinen Teil dessen ausgedehntes autarkes Gebiet erklärt. Das Klima wird in Naturfinnland strenger und die Ernte wegen der oft ungünstigen Sommer unsicherer. Nach der von Alestalo durchgeführten Gebiets-einteilung aufgrund der Verbreitung und Häufigkeit der Kulturpflanzen fällt die Grenze zwischen der Zone der mittelfinnischen Polykulturen und der Zone der nordfinnischen Oligokulturen mit der obigen Grenze zwischen Kulturfinnland und Naturfinnland zusammen (Alestalo 1965, S. 22, 23).

Kartoffel (Karte 3). Ein grosses Gebiet in Naturfinnland ist autark. Kemi, Rovaniemi und Kemijärvi haben jedoch ihre eigenen Sammelgebiete in der Nähe der Zentren. Die Verkaufsgebiete der Kartoffel werden also nicht nur durch das strengere Klima sondern auch durch die Entfernung vom Zentrum, die Absatzverhältnisse u. dgl. beeinflusst. Auch die Gemeinde Pyhäjärvi ist autarkes Gebiet, weil sie weit von den grossen Zentren entfernt liegt. Von den Kartoffelanbaugebiet liegen in Kulturfinnland 2,5 % und in Naturfinnland 2,9 %, was also bedeutet, dass im Verhältnis etwa gleich viel Kartoffel angebaut wird.

Die Betriebsareale sind für die Kartoffel etwa genau so gross wie die Vermittlungsareale.

Gemüse und Gartenerzeugnisse (Karte 4). Der ganze zu Naturfinnland gehörige Teil des untersuchten Gebietes ist autarkes Gebiet, wie bezüglich des Getreides. Der Anteil der Gärten an der Ackerfläche beträgt in Kulturfinnland 0,1 % und in Naturfinnland 0,08 %. Die Autarkie des zu Naturfinnland gehörigen Teils ist ausser durch die geringe Anbaufläche auch durch das strengere Klima und die grösseren Entfernungen von den Zentren bedingt.

Mit Ausnahme des grossen Betriebs- und Vermittlungsareals von Oulu sind die Sammelgebiete klein. Gemüse und Gartenerzeugnisse werden nur aus der näheren Umgebung in die Zentren verkauft. In den Tälern des Kalajoki und des Pyhäjoki gibt es zwischen dem Einflussbereich Oulus und dem Kokkolas viel autarkes Gebiet, weil die genannten grösseren Zentren weit entfernt sind.

Milch (Karte 5). Aus der Karte sind die Sammelgebiete der Molkereien und Geschäfte in den Städten und Marktflecken ersichtlich. Es ist jedoch zu beachten, dass auch die Molkereien anderer Flecken Milch kaufen und diese sowie Milchprodukte in die grossen Zentren weiterliefern (an die Zentralgenossenschaft Valio in Helsinki und Oulu). Das ganze untersuchte Gebiet ist also Verkaufsgebiet für Milch und Vermittlungsgebiet des grossen Zentren. In der Anzahl der Kühe besteht im untersuchten Gebiet kein grosser Unterschied zwischen Kulturfinnland und Naturfinnland. Auf 100 Personen der landwirtschaftlichen Bevölkerung entfallen im ersteren Gebiet 100 und im letzteren 80 Kühe.

Schlachtvieh und Fleisch (Karte 6). Schlachtvieh und Fleisch werden von den Bauern, von Einkäufern und von den ländlichen Geschäften in die Zentren geliefert. Die Vermittlungsgebiete der Einkäufer sind davon die grössten, und sie vermitteln auch den grössten Teil des Verkaufs. Auf der Karte sind die Vermittlungsgebiete der Einkäufer eingezeichnet. Schlachttiere und Fleisch werden aus dem ganzen untersuchten Gebiet in die Zentren geliefert. Stellenweise bilden sich auch Wettbewerbsareale zwischen den Zentren, wobei sich also die Sammelgebiete zweier Zentren etwas überdecken.

In dem zu Kulturfinnland gehörigen Teil des untersuchten Gebietes entfallen auf 100 über 2 ha grosse Betriebe 450 Rinder, 60 Schweine und 130 Schafe. Die entsprechenden Zahlen in dem zu Naturfinnland gehörigen Teil sind 420, 40 und 210. Die Rinder sind gleichmässig im untersuchten Gebiet vertreten, dagegen nimmt sowohl die relative als auch die gesamte Anzahl von Schweinen nach Norden hin schnell

ab, und im Rentierzuchtgebiet werden Schweine nicht mehr gehalten. Die geringe Anzahl von Schweinen in Nordfinnland ist u.a. durch die unsichere Kartoffelernte bedingt.

Felle und Häute (Karte 7). Das untersuchte Gebiet ist völlig Sammelgebiet verschiedener Zentren. Die Vermittlungsareale von Oulu und Kokkola sowie von Oulu und Rovaniemi überdecken sich etwas. Die Betriebsareale sind gross, aber die Vermittlungsareale sind dennoch grösser als diese. Zwischen den Betriebsarealen liegt also weiter von den Zentren entfernt Vermittlungsareal.

Eier (Karte 8). Weiter von den Zentren entfernt gibt es grosse autarke Gebiete, wie z.B. in den nördlichen Teilen des untersuchten Gebietes. Kemi und Rovaniemi haben ihre kleinen Sammelgebiete und Kemijärvi einzelne kleine Liefergebiete. Autarkes Gebiet gibt es auch stellenweise im Tal des Pyhäjoki und in Pyhäjärvi. Oulu hat ein grosses Betriebsareal, sonst sind die Vermittlungsareale grösser als die Betriebsareale. Besonders Kajaanis Vermittlungsareal ist gross im Vergleich zu seinem Betriebsareal.

Sowohl die relative als auch die gesamte Anzahl von Hühnern wird in Naturfinnland deutlich geringer. In dem zu Kulturfinnland gehörigen Teil des untersuchten Gebietes entfallen auf 100 über 2 ha grosse Betriebe 690 Hühner und in dem zu Naturfinnland gehörigen Teil nur 240 Hühner, was für seinen Teil die grossen autarken Gebiete im nördlichen Teil des untersuchten Gebietes erklärt.

Waldbeeren (Karte 9). Das ganze untersuchte Gebiet ist Sammelgebiet der Zentren. Die Vermittlungsareale von Oulu, Kokkola und Kajaani sind deutlich grösser als ihre Betriebsareale. Die Betriebsareale sind im allgemeinen gross.

Holz (Karte 10). Der Holzhandel ist zum Teil von der Industrie abhängig. Der Einfluss der Industrie ist anderer Art als der sonstige Einfluss der Zentren auf die Areale der ländlichen Erzeugnisse. Die Sammelgebiete der verschiedenen Zentren überdecken sich in weiten Bereichen, so dass z.B. das von Oulu allein beherrschte Gebiet klein ist. Die Grenze des Holz-Areals von Oulu deckt sich ungefähr mit den äussersten Grenzen seiner anderen ländlichen Erzeugnisse. Nach Kainuu hin erstreckt sich das Holzareal von Oulu jedoch viel weiter als die Areale der anderen ländlichen Erzeugnisse. Dort liegt nur ein Teil von Kuhmo ausserhalb des Einflusses von Oulu. Im Süden erstreckt sich das Areal von Oulu bis zur Grenze des Regierungsbezirkes, wie die Areale auch einiger anderer Erzeugnisse. Von den

Holzarealen der anderen Zentren im untersuchten Gebiet sei erwähnt, dass das Areal von Kemi viel grösser ist als die Areale seiner anderen ländlichen Erzeugnisse. Dazu gehört das ganze Gebiet des Kemijoki im nördlichen Teil des untersuchten Gebietes. Die Holzareale von Rovaniemi, Kajaani, Kemijärvi, Iisalmi und Raahen sind nicht grösser als die Areale der anderen Erzeugnisse. Pietarsaari wirkt nur als Käufer von Holz in den Tälern des Kalajoki und des Pyhäjoki. Der Einfluss von Kokkola ist schwach, es wirkt nach den Antworten nur im Bereich einiger Schulbezirke des untersuchten Gebietes.

Die Betriebsareale der Städte und Marktflecken erstrecken sich auf das Gebiet mehrerer Gemeinden. In die anderen Flecken der Zentrumsklasse IV werden ländliche Erzeugnisse im allgemeinen nur aus dem Bereich der eigenen Gemeinde oder einem Teil davon verkauft. In allen Zentren werden aus dem Bereich der eigenen Gemeinde Kartoffeln und Waldbeeren verkauft, und in die zu Kulturfinnland gehörigen Zentren ausserdem Getreide und Eier. Felle und Häute kaufen nur die Kirchdörfer Kuusamo und Kuhmo aus dem ganzen Bereich ihrer Gemeinde. Auch Gemüse und Gartenerzeugnisse werden im allgemeinen nicht aus dem ganzen Bereich der Gemeinde gekauft, sondern nur aus der näheren Umgebung des Zentrums.

Zu den Betriebsarealen der Flecken der Zentrumsklasse II und III gehört im allgemeinen höchstens das Gebiet der eigenen Gemeinde. Eine Ausnahme stellt das Betriebsareal des Kirchdorfes Vihanti für Kartoffeln dar, das aus mehreren Gemeinden besteht, deren Betriebe Kartoffeln an die Kartoffelflockenfabrik in Vihanti liefern.

Von den ländlichen Erzeugnissen werden Milch, Schlachttiere und Fleisch, Felle und Häute, Waldbeeren und Holz im allgemeinen von weiter her in die Zentren vermittelt als andere Erzeugnisse. Das sind auch die wichtigen Verkaufsartikel der Landwirtschaft in dem untersuchten Gebiet.

Ein Vergleich zwischen dem Betriebsareal und dem Vermittlungsareal eines Zentrums für ein bestimmtes Produkt zeigt, dass die Vermittlungsareale im allgemeinen grösser sind als die Betriebsareale. In einigen Fällen decken sich die Vermittlungsareale und die Betriebsareale. Nur in Ausnahmefällen ist das Betriebsareal grösser als das Vermittlungsareal.

Die Vermittlungsareale der Flecken der Zentrumsklasse IV entstehen hauptsächlich durch die Vermittlung von Erzeugnissen, die die Filialen der Genossenschaften an die Hauptgeschäfte im Flecken vornehmen.

Zum Netz dieser genossenschaftlichen Geschäfte gehört im allgemeinen das Gebiet der eigenen Gemeinde oder zusätzlich der eigenen das Gebiet einer Nachbargemeinde. In den grösseren Flecken der Zentrumsklasse IV (Ylivieska, Raahe, Iisalmi, Kemijärvi) gehören zum Netz der genossenschaftlichen Geschäfte mehrere Gemeinden. Das Vermittlungsgebiet ist in einigen Fällen grösser als die obigen Genossenschaftsgebiete, wie Ylivieskas Vermittlungsgebiete für Getreide und Kartoffeln, was sich daraus erklärt, dass in Ylivieska ein staatliches Getreidelager und eine Kartoffelfabrik ist. Die Einkäufer vermitteln nach Ylivieska Fleisch und Tiere auch von ausserhalb des Netzes genossenschaftlicher Geschäfte. Einige Vermittlungsareale Iisalmis im untersuchten Gebiet sind grösser als das Gebiet seines Netzes genossenschaftlicher Geschäfte.

Die meisten Flecken der Zentrumsklasse II und III haben ein das Gebiet der eigenen Gemeinde umfassendes Netz von genossenschaftlichen Geschäften, das für die Vermittlung der ländlichen Erzeugnisse an das Hauptgeschäft im Kirchdorf sorgt. Zum Gebiet einiger von diesen gehören zwei Gemeinden, und nur die Konsumgenossenschaft von Utajärvi umfasst drei Gemeinden.

Von den kleineren Zentren wirkten als Käufer von Holz in nennenswertem Umfange nur Suomussalmi—Ämmäsaari, Hyrynsalmi, Kuhmo, Sotkamo, Kiuruvesi, Pyhäjärvi und Haapajärvi (Karte 10).

Kauf, Vermittlung und Wiederverkauf der verschiedenen ländlichen Erzeugnisse im Ort sind in Tabelle 1 aufgegliedert. Die Statistik umfasst 786 Haupt- und Filialgeschäfte von Konsumgenossenschaften

Tabelle 1. Von den Geschäften mit Aufkauf von ländlichen Erzeugnissen

	Kauften		Vermittelten		Verkauften nur am Ort	
	Anzahl	%	Anzahl	%	Anzahl	%
Getreide	408	51.9	368	46.9	40	5.1
Bauernbutter	180	22.9	90	11.5	90	11.5
Fleisch	459	58.4	124	15.8	335	42.6
lebende Tiere	303	38.5	298	37.9	5	0.6
Felle, Häute	431	54.8	421	53.6	10	1.3
Wolle	465	59.2	455	57.9	10	1.3
Eier	635	80.8	278	35.4	357	45.4
Kartoffeln	644	81.9	366	46.6	278	35.4
Gemüse und Garten- erzeugnisse	403	51.3	190	24.2	213	27.1
Fisch	408	51.9	126	16.0	282	35.9
Waldbeeren	617	78.5	601	76.5	16	2.0
Holz	95	12.1	83	10.6	12	1.5

sowie private Geschäfte. Die Filialen der Konsumgenossenschaften sind berücksichtigt, soweit die betreffende Statistik von ihnen zu haben war.

Von den Geschäften im untersuchten Gebiet, die ländliche Erzeugnisse kauften, kaufte also der grösste Teil Kartoffeln, Eier und Waldbeeren. Über die Hälfte der Geschäfte kaufte Getreide, Gemüse und Gartenerzeugnisse, Fleisch, Felle und Häute, Wolle und Fisch. Fleisch und Holz dagegen wurde mehr von den Einkäufern vermittelt als von den Geschäften. Der Handel mit Bauernbutter ist heute ziemlich gering.

Von den Geschäften, die ländliche Erzeugnisse kaufen, vermittelte der grösste Teil Waldbeeren. Über die Hälfte der Geschäfte vermittelte Felle und Häute sowie Wolle. Nahezu die Hälfte der Geschäfte vermittelte Getreide und Kartoffeln. Solche Erzeugnisse, die viele Geschäfte ausschliesslich am Ort wiederverkauften, waren Fleisch und Eier (über 40 % der Geschäfte), Fisch und Kartoffel (über 30 % der Geschäfte) sowie Gemüse und Gartenerzeugnisse (über 25 % der Geschäfte).

Zum Grosshandelsgebiet der Lebensmittelbranche von Oulu (Karte 11) gehört der ganze Regierungsbezirk Oulu und es erstreckt sich noch weiter nach Norden als das untersuchte Gebiet. Die Grosshandelsgebiete der anderen Zentren (Kokkola, Kajaani, Kemi, Rovaniemi, Iisalmi, Kemijärvi) decken sich im untersuchten Gebiet mit den absoluten Arealen ihres Handels mit landwirtschaftlichen Erzeugnissen, wie auch das Gebiet von Oulu an der Südgrenze des Regierungsbezirkes. Nur das Fleischvermittlungsareal von Rovaniemi ist grösser als sein Grosshandelsgebiet. Dass sich die absoluten Areale des Handels mit ländlichen Erzeugnissen und die Grosshandelsgebiete der Lebensmittelbranche decken, erklärt sich daraus, dass die Autos des Grosshandels, wenn sie Waren aus dem Zentrum bringen, die von den Geschäften auf dem Lande angebotenen ländlichen Erzeugnisse mitnehmen. Ebenso nehmen die Autos der Konsumgenossenschaften und der privaten Kaufleute, wenn sie Erzeugnisse ihrer Gegend ins Zentrum bringen, gleichzeitig Waren aus dem Zentralgeschäft mit.

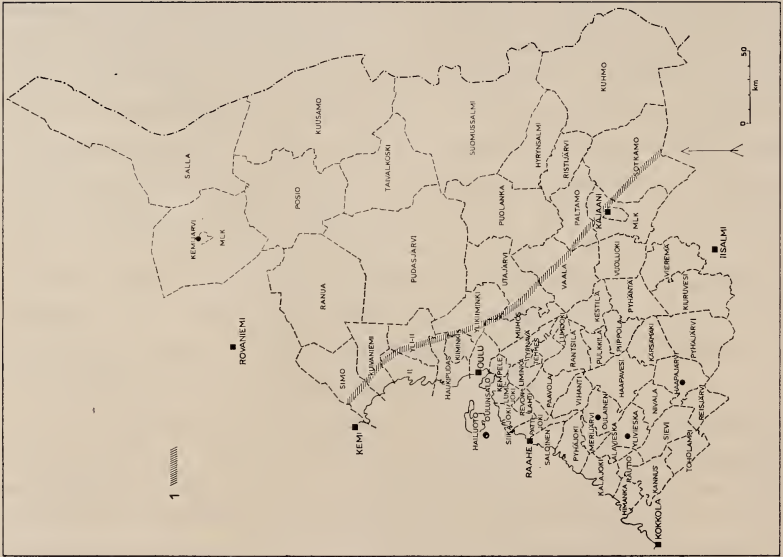
Die relativen Einflussgebiete der Flecken im untersuchten Gebiet sind aus den Karten 12—14 ersichtlich. Die Einflussgebiete der betreffenden Zentren sind auf den Karten mit Hilfe der Gebiete des Handels mit ländlichen Erzeugnissen, der Versorgung und der Dienstleistungen verallgemeinert, so dass an der Grenzlinie zwischen den Ein-

flussgebieten, an der sog. relativen Grenze, der Einfluss der beiden Zentren als gleich gross zu betrachten ist. Natürlich sind in dieser Hinsicht Einflussgebiete von solchen Flecken zu vergleichen, die ungefähr zu den gleichen Zentrumklassen gehören (Svento 1967, S. 27, 28).

Im untersuchten Gebiet ist nur Kemis Areal des Handels mit landwirtschaftlichen Erzeugnissen deutlich kleiner als sein Versorgungs- und Dienstleistungsgebiet. Die Karten 12—14 zeigen also auch die relativen Einflussgebiete des Handels mit ländlichen Erzeugnissen und gleichzeitig die Zentren des untersuchten Gebietes, die deutlich den Einfluss eines Zentrums ausüben.

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Karte 1. Das untersuchte Gebiet. 1) Die Grenze zwischen Kulturfinland und Naturfinland.



Karte 2. Die Sammelgebiete für Getreide. a) Das Betriebsareal und b) die Grenze des Vermittlungsareals von 1) Oulu, 2) Kokkola, 3) Kajaani, 4) Kemi, 5) Rovaniemi, 6) Raahen, 7) Ylivieska, 8) Iisalmi und 9) Kemijärvi.



Karte 4. Die Sammelgebiete für Gemüse und Gartenerzeugnisse. a) Das Betriebsareal und b) die Grenze des Vermittlungsareals von 1) Oulu, 2) Kokkola, 3) Kajaani, 4) Kemi, 5) Rovaniemi, 6) Raahen, 7) Iisalmi und 8) Kemi-järvi.



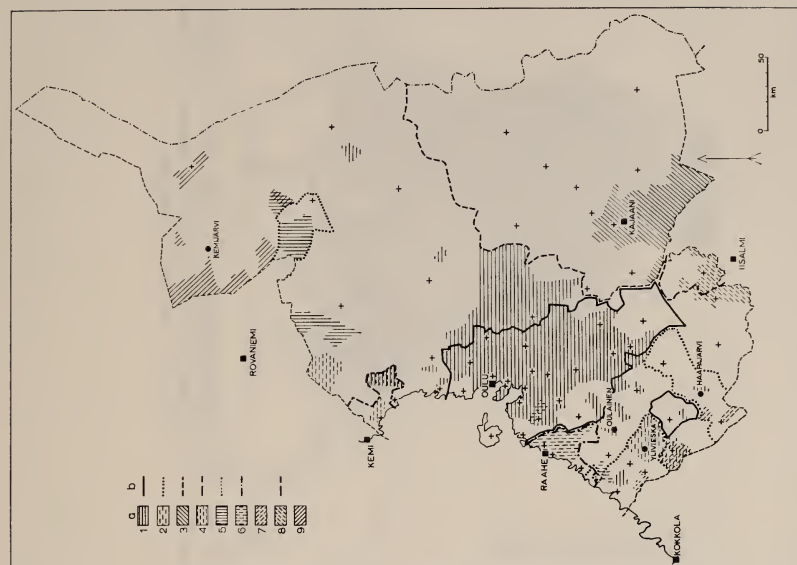
Karte 3. Die Sammelgebiete für Kartoffeln. a) Das Betriebsareal und b) die Grenze des Vermittlungsareals von 1) Oulu, 2) Kokkola, 3) Kajaani, 4) Kemi, 5) Rovaniemi, 6) Raahen, 7) Ylivieska, 8) Iisalmi und 9) Kemi-järvi.



Karte 5. Die Sammelgebiete für Milch von 1) Oulu, 2) Rovaniemi, 3) Kajaani, 4) Raahen, 5) Ylivieska, 6) Iisalmi und 7) Kemijärvi.



Karte 6. Die Sammelgebiete für Schlachttiere und Fleisch von 1) Oulu, 2) Kokkola, 3) Kajaani, 4) Kemijärvi, 5) Rovaniemi, 6) Raahen, 7) Ylivieska, 8) Iisalmi, 9) Kemijärvi und 10) Tornio.



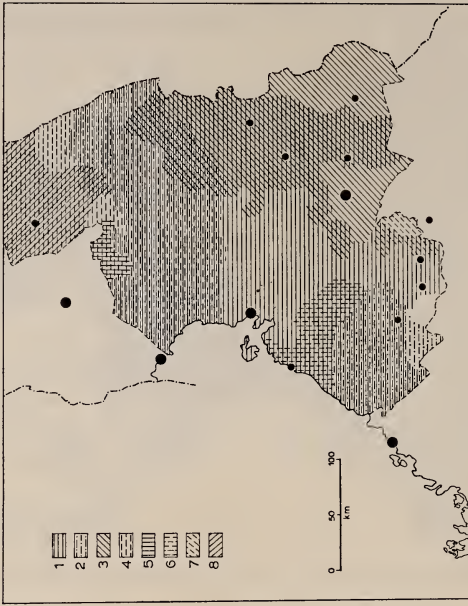
Karte 8. Die Sammelgebiete für Eier. a) Das Betriebsareal und b) die Grenze des Vermittlungsareals von 1) Oulu, 2) Kokkola, 3) Kajaani, 4) Kemijärvi, 5) Rovaniemi, 6) Raahen, 7) Ylivieska, 8) Iisalmi und 9) Kemijärvi.



Karte 7. Die Sammelgebiete für Felle und Häute. a) Das Betriebsareal und b) die Grenze des Vermittlungsareals von 1) Oulu, 2) Kokkola, 3) Kajaani, 4) Kemijärvi, 5) Rovaniemi, 6) Raahen, 7) Ylivieska, 8) Iisalmi und 9) Kemijärvi.



Karte 9. Die Sammelgebiete für Waldbeeren. a) Das Betriebsareal und b) die Grenze des Vermittlungsareals von 1) Oulu, 2) Kokkola, 3) Kajaani, 4) Kemi, 5) Rovaniemi, 6) Raahе, 7) Ylivieska, 8) Iisalmi, 9) Kemijärvi und 10) Tornio.



Karte 10. Die Sammelgebiete für Holz von 1) Oulu, 2) Pietarsaari, 3) Kajaani, 4) Kemi, 5) Rovaniemi, 6) Raahе, 7) Iisalmi und 8) Kemijärvi.



Karte 12. Die relativen Einflussgebiete der Flecken der Zentrumsklassen V und VI. Die Grenze des relativen Einflussgebietes von 1) Oulu, 2) Kemi, 3) Rovaniemi, 4) Kajaani und 5) Kokkola.



Karte 11. Lebensmittelgrosshandel. Grenze des Gebietes von 1) Oulu, 2) Kokkola, 3) Kajaani, 4) Kemi, 5) Rovaniemi, 6) Isalmi und 7) Kemijärvi.



Karte 13. Die relativen Einflussgebiete der Flecken der Zentrumsklasse IV.



Karte 14. Die relativen Einflussgebiete der Flecken der Zentrumsklasse II und III. 1) Ein Flecken der Zentrumsklasse III und die Grenze seines Einflussgebietes. 2) Ein Flecken der Zentrumsklasse II und die Grenze seines Einflussgebietes. 3) Ein Kirchdorf und die Grenze seines Einflussgebietes.

ÜBER DIE REGIONALE DIFFERENZIERUNG DER LANDWIRTSCHAFT IM LÄN LAPPLAND

von

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EINLEITUNG

Die Landwirtschaft im Län Lappland steht im Brennpunkt der Gegenwart. Das Gebiet, von dessen Bewohnern über 85 000 oder etwa 42 % im Jahre 1960 ihr Einkommen aus der Land- und Forstwirtschaft bezogen haben (SVT VI 103; 1963), vertritt den äussersten nördlichen Vorposten der auf Landwirtschaft gestützten Besiedlung. Das strenge Klima im Verein mit den Schwierigkeiten, die der zurzeit betriebene Besiedlungsprozess auslöst, bereitet den Bauern Behinderungen, die in den südlicheren Gegenden nicht bestehen. In letzter Zeit scheinen sie durch die von der Landwirtschaft abrückende Ausrichtung der in Finnland betriebenen Wirtschafts- und Sozialpolitik ziemlich stark zugenommen zu haben.

Bei einem Gebiet von der Grösse des Läns Lappland (Abb. 1) ist es natürlich, dass seine Landwirtschaft sich nicht überall auf gleiche Voraussetzungen stützt. Schon in den Naturbedingungen besteht ein Unterschied. Das *Südwestliche Küstengebiet*, das die Landgemeinden Simo, Tervola, Kemi, die Gemeinden Alatornio und Karunki sowie die Städte Kemi und Tornio umfasst, ist vom Standpunkt der landwirtschaftlichen Voraussetzungen der günstigste Teil des Läns Lappland. Die Dauer der Vegetationsperiode macht dort 140—145 Tage aus und die der Bearbeitungszeit annähernd 170 Tage. Das Jahresmittel der Temperatur beträgt 1—2° C und die Niederschlagsmenge 500—600 mm (Kolkki 1960, Karten 5/1, 9 und 6/11, Angervo 1960, Karte 5/10). Infolge des günstigen Klimas ist die Vegetation im all-



Abb. 1. Das Län Lappland und seine Gemeinden.

gemeinen üppiger als andernorts im Län Finnland, was teilweise auch auf die Flusslauf-Tonebenen und besonders auf den Kalkgehalt im Felsgrund des westlichen Gebietsteils zurückzuführen ist (vgl. Okko 1946; 1960, Karte 4; Väyrynen 1954, S. 202—205 u.a.). Die Moore machen im Gebiet über 60 % der Landfläche aus, abgesehen von einem schmalen Küstenstreifen, wo sie sich auf 40—50 % der Landfläche belaufen. Der häufigste Waldtyp auf wüchsigem Waldboden ist der Rauschbeer-Preiselbeerentyp (EVT), im Nordostteil der nördliche Untertyp des Blaubeerentyps (MT) (Ilvessalo 1960, Karten 10 und 13). Die absolute Höhe des Gebiets ist klein, was zusammen mit der südlichen Lage ein dem Landbau der Gegend zugute kommender Vorteil ist. In *Nordbottnien*, wozu die Gemeinden Posio, Ranua, Ldg. Rovaniemi, Ylitornio, Pello und Kolari sowie die Stadt Rovaniemi gehören, dauert die Vegetationsperiode etwa 130—140 Tage und die Bearbeitungszeit höchstens 165 Tage. Das Jahresmittel der Temperatur beträgt etwa 0—1° C und die Niederschlagsmenge rd. 500—550 mm (Kolkkki 1960, Karten 5/1, 9 und 6/11; Angervo 1960, Karte 5/10). Tonbodenarten kommen im Gebiet wenig vor. Zu *Mittellappland* gehören die Gemeinden Salla, Ldg. Pelkosenniemi von Kemijärvi, Savukoski, Sodan-

kylä, Kittilä und Muonio sowie der Flecken Kemijärvi. Die Vegetationsperiode zählt 125—135 Tage und die Bearbeitungszeit im grössten Teil des Gebiets höchstens 155 Tage. Das Jahresmittel der Temperatur beträgt etwa 0—1°C und die jährliche Niederschlagsmenge 450—550 mm (Kolkki 1960, Karten 5/1, 9 und 6/11; Angervo 1960, Karte 5/10). Die Waldvegetation ist in gewissem Masse üppiger als im vorhergehenden Gebiet, denn der häufigste Waldtyp ist im grössten Teil des Gebiets Rauschbeer-Blaubeerentyp (EVT) (Ilvessalo 1960, Karte 10). Die absolute Höhe des Gebiets ist schon beeinträchtigend gross, 300—600 m ü.d.M., was so weit nördlich vom Standpunkt des örtlichen Klimas dem Landbau erhebliche Beschränkungen verursacht.

Nordlappland umfasst den nördlichsten Teil des Läns Lappland oder die Gemeinden Enontekiö, Inari und Utsjoki. Es ist hohes Gebiet. Die Vegetationsperiode dauert überall weniger als 125 Tage und auch die Bearbeitungszeit weniger als 145 Tage. Die jährliche Niederschlagsmenge ist ebenfalls geringer als andernorts im Län Lappland oder unter 450 mm, und das Jahresmittel der Temperatur beträgt 0—1°C, im Nordwestteil sogar auch weniger (Kolkki 1960, Karten 5/1, 9; Angervo 1960, Karte 5/10). Das strenge Klima zusammen mit der hohen Lage des Gebiets ist landwirtschaftlich ein fast unüberwindlicher Schadensfaktor.

In den Naturverhältnissen teilt sich das Län Lappland somit in Zonen, in denen die Voraussetzungen für das Betreiben von Landwirtschaft von der Küstengegend des Bottnischen Meerbusens aus nach Nordosten und Norden schwieriger werden. Ungefähr ähnliche regionale Unterschiede lassen sich auch bei dem anderen Grundfaktor der Landwirtschaft, der menschlichen Tätigkeit, erkennen. Der Schwerpunkt der Besiedlung im Gebiet liegt deutlich im Südwesten, wo sich auch das dichteste Strassennetz erstreckt (vgl. Aario-Smeds 1960, Karte 15; Helle 1964, S. 22—35; Varjo 1965, S. 17). An den Unter- und Mittelläufen der Flüsse Tornionjoki und Kemijoki ist die Agrarlandschaft schon ein Vermächtnis von Jahrhunderten, während im Nordosten und Norden die Naturlandschaft fast ungestört daliegt. Von Südwesten nach Nordosten schreiten im Län Lappland ebenfalls die Neuerungen vor, in erster Linie Rationalisierung und Mechanisierung der Landwirtschaft, Erscheinungen, die überall für das Entwickeln der gegenwärtigen Landwirtschaft kennzeichnend sind. Vom Blickpunkt der Landwirtschaft bestehen also auch in dieser Hinsicht Unterschiede zwischen den verschiedenen Teilen des Läns Lappland.

DIE LANDWIRTSCHAFT IM LÄN LAPPLAND

Bei Erforschung der regionalen Differenzierung der Landwirtschaft hat man in Finnland meistens nach Gemeinden aufgestellte Statistiken benutzt (vgl. jedoch z.B. Hult 1966). Diese Methode lässt sich am besten in Gebieten mit Gemeinden von kleiner Grösse anwenden. Ein solches ist unter anderem Südwestfinnland (vgl. Varjo 1956 und 1958). In Gebieten mit grossen Gemeinden können nach Gemeinden aufgestellte Statistiken nur dann gebraucht werden, wenn wenig Möglichkeiten für einen gegenseitigen Wechsel der verschiedenen landwirtschaftlichen Produktionsrichtungen bestehen. So verhält es sich denn auch im Län Lappland, dessen Nordteil nach Alestalo (1965, S. 22—23) zu Fjeldlapplands und dessen Südteil zur nordfinnischen Oligokulturzone der Getreidepflanzen gehört. Demgegenüber ist jedoch festzustellen, dass die dortigen Gemeinden, oft beinahe so gross wie die südfinnischen Läne, nur die Möglichkeit zu einer ganz generellen Betrachtung des Sachverhalts geben, trotzdem in denjenigen Südwestteilen des Läns Lappland, wo die Voraussetzungen der Landwirtschaft die besten sind, die Gemeinden oft verhältnismässig klein sind.

Landbau

Die regionalen Züge des Landbaus im Län Lappland werden im Folgenden nach dem Material der landwirtschaftlichen Erhebung von 1959 (vgl. Varjo 1967) betrachtet. Dabei werden die Ackerfläche der Betriebe, ihre Grundbesitzgrösse, ihre Bodennutzungsarten und ihre Ackernutzung sowie die danach berechnete relativ. Intensität des Landbaus berücksichtigt (vgl. Varjo 1967, S. 51—52).

Der Anteil des Ackers an der gesamten Bodenfläche der Betriebe (Abb. 2) war im Län Lappland am grössten in den südwestlichen Gemeinden, in Simo, der Ldg. Kemi, in Tervola, Alatornio und Karunki, wo er 6 % übertraf. Von diesem Gebiet aus verminderte sich der Anteil des Ackers gegen Norden und Nordosten derart, dass er in den Betrieben der nördlichen Gemeinden des Läns nur noch kaum 3 % ausmachte.

Auch die Grösse der Landgüter wechselte 1959 im Gebiet des Läns Lappland stark. Dies ist aus Karte 4 zu ersehen, auf der die Quadrate die Mittelgrösse der Landgüter in den Gemeinden des Läns Lappland darstellen. Die Quadrate sind in flächentreue Teile zerlegt, die die durchschnittlichen Flächen der einzelnen Bodennutzungsarten darstel-

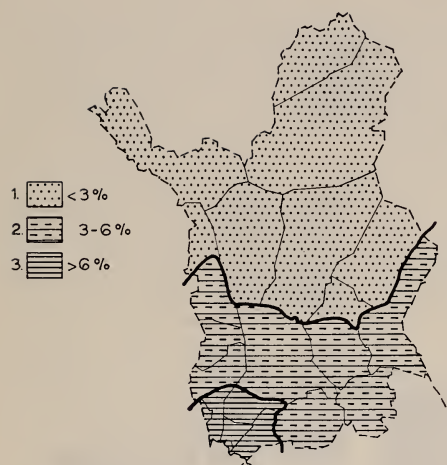


Abb. 2. Der Anteil des Ackers an der Landfläche der Betriebe im J. 1959 (links).

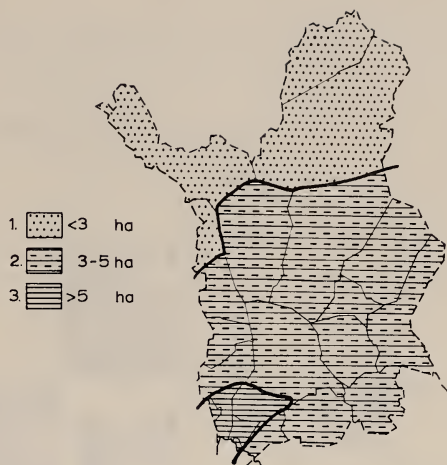


Abb. 3. Acker je Betrieb im J. 1959 (rechts).

len. Nach der Karte lagen die kleinsten Landgüter im Süd- und Südwestteil des Läns. In Karunki und Alatornio war ihre durchschnittliche Fläche kleiner als 50 ha und ungefähr bis in die Gegend Kolari—Salla kleiner als 100 ha. Die grössten Landgüter lagen 1959 in den Gemeinden des Mittel- und Ostteils des Läns, wo ihre durchschnittliche Fläche 150 ha übertraf. Trotz der beträchtlichen Grösse der Landgüter war ihre Ackerfläche doch klein (vgl. Abb. 3). Nur in vier Gemeinden machte sie über 5 ha aus. An Betrieben mit über 20 Ackerhektar gab es im ganzen Län Lappland 1959 nur 97, davon nur drei im Gebiet der Landwirtschaftsgesellschaft Lapplands. Im Län Lappland scheinen also die Landgüter im allgemeinen um so grösser zu werden, je weiter man nach Norden kommt, aber ihre Ackerfläche verringert sich entsprechend. Die grössten durchschnittlichen Ackerflächen fanden sich denn auch 1959 im Süd- und Südwestteil des Läns und im allgemeinen in Gebieten, wo die Landgutgrösse am kleinsten ausfiel, während die Ackerflächen der Betriebe in den nördlichsten Gemeinden des Läns am kleinsten waren. Gegengewichte der kleinen Äcker waren im Norden jedoch Wiesen und Weiden, deren durchschnittliche Fläche z.B. in Enontekiö grösser als im übrigen Län Lappland war oder 8.6 ha betrug.

Wüchsigen Waldboden (Abb. 4) gab es auf den Landgütern der

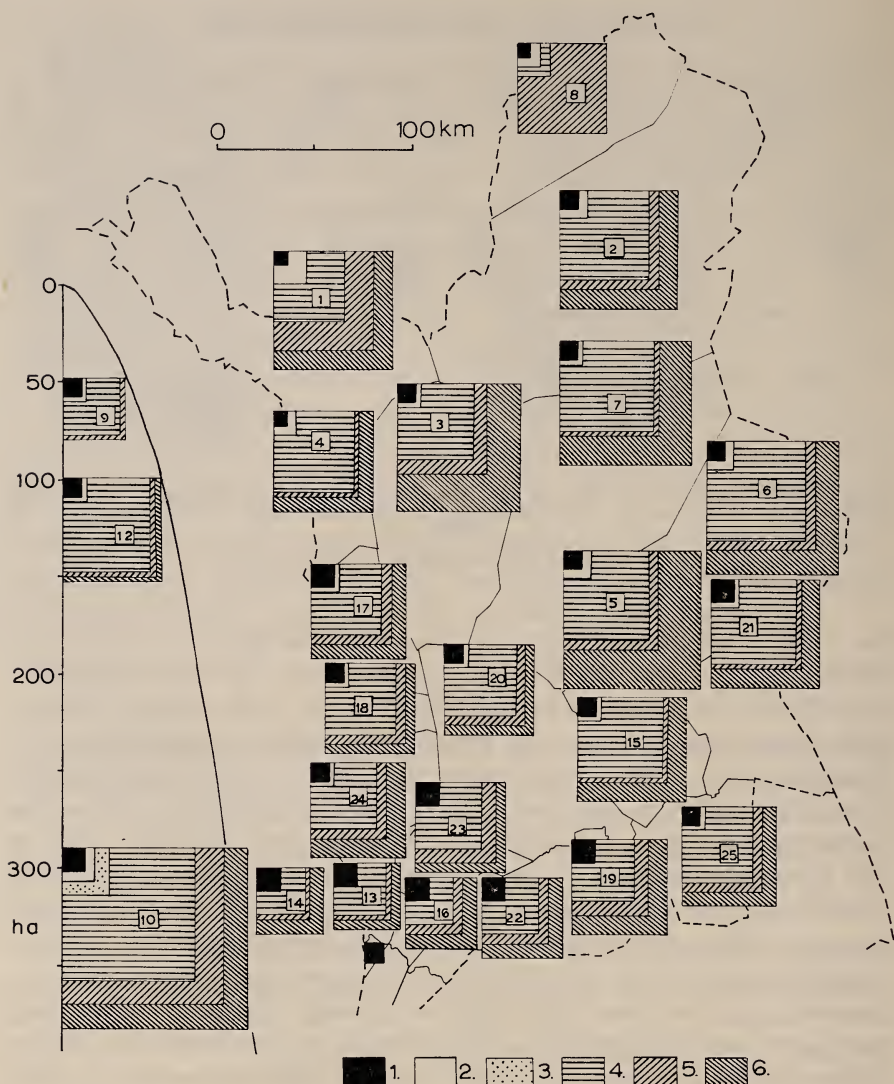


Abb. 4. Der durchschnittliche Flächeninhalt der Bodennutzungsarten der Betriebe im J. 1959. 1. Acker, 2. Wiese und Weide, 3. Grundstück usw., 4. wüchsiger Waldboden, 5. unfruchtbarer Waldboden, 6. Unland. Die Nummern in der Mitte der die Betriebe darstellenden Figuren bedeuten die Gemeinden: 1. Enontekiö, 2. Inari, 3. Kittilä, 4. Muonio, 5. Pelkosenniemi, 6. Savukoski, 7. Sodankylä, 8. Utsjoki, 9. Kemi, 10. Rovaniemi, 11. Tornio, 12. Kemijärvi, 13. Alatornio, 14. Karunki, 15. Ldg. Kemijärvi, 16. Ldg. Kemi, 17. Kolari, 18. Pello, 19. Ranua, 20. Ldg. Rovaniemi, 21. Salla, 22. Simo, 23. Tervola, 24. Ylitornio und 25. Posio.

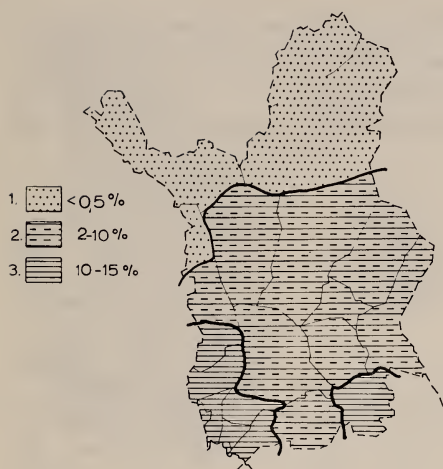


Abb. 5. Der Anteil der Gerste in % der Ackerfläche 1959 (links).

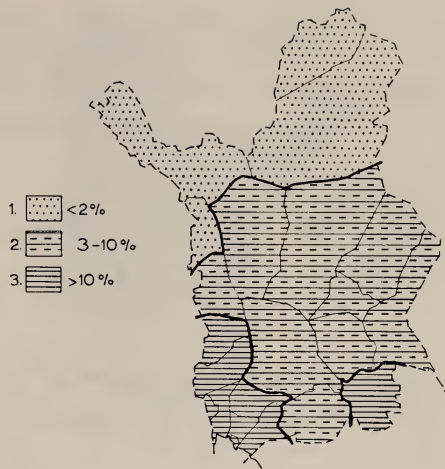


Abb. 6. Anteil der Futtergetreide in % der Ackerfläche 1959 (rechts).

Landgemeinden des Läns Lappland am meisten in dessen mittleren Teilen, wie in Savukoski, Sodankylä, Pelkosenniemi, Salla, Inari und Muonio, wo überall die durchschnittliche Fläche der Landgüter über 70 ha überschritt. Kleinere Flächen wüchsigen Waldbodens waren dagegen kennzeichnend in den südwestlichen Gemeinden des Läns, unter denen er in Alatornio, Karunki, der Ldg. Kemi und in Simo weniger als 30 ha ausmachte.

Auch Unland (Abb. 4) fand sich auf den Landgütern der verschiedenen Teile des Läns Lappland in sehr weiter Ausdehnung. Sehr reichlich erschien es in den Gemeinden Pelkosenniemi, Savukoski, Sodankylä, Kittilä, Inari und Enontekiö, in denen allen sich die Fläche des Unlands der Landgüter durchschnittlich auf über 40 ha belief, in Pelkosenniemi sogar auf über 100 ha oder über die Hälfte der Gesamtfläche der Güter. Dagegen erschien in den südlichen und südwestlichen Teilen des Läns in Anbetracht seiner Verhältnisse wenig Unland.

Bei den Bodennutzungsarten sind die Anteile von Gerste und Wiesengräsern an der Ackerfläche berücksichtigt worden. Von den eigentlichen Brotgetreidearten baute man 1959 im Gebiet Roggen bis in die Gegend Kolari—Pelkosenniemi—Salla an, aber selbst in den besten Fällen nahm er weniger als 0,5 % der Ackerfläche ein. Gerste dagegen wurde im Län Lappland noch allgemein kultiviert (Abb. 5). Am meisten wuchs sie in dem Gebiet Pello—Tervola—Simo und südwestlich

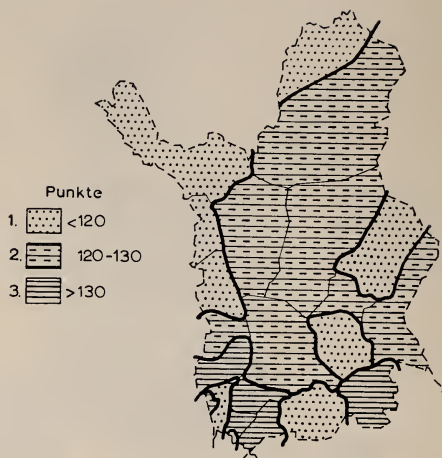
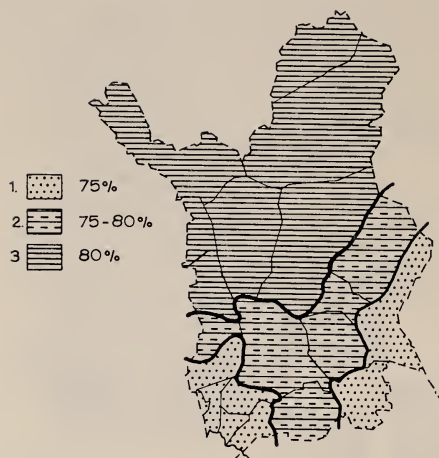


Abb. 7. Feldgras in trockenem Zustand prozentual von der Ackerfläche aller Betriebe 1959 (links).

Abb. 8. Die relative Intensität des Landbaus je Ackerfläche 1959 (rechts).

davon sowie in Posio, wo ihr Anteil zwischen 10 und 15 % der Ackerfläche wechselte. In Mittellappland betrug der Anteil der Gerste an der Ackerfläche 5—10 %, in Muonio, Enontekiö und Inari 1—5 % und in Utsjoki weniger als dies.

Der Anbau von Wiesengräsern ist im Län Lappland sehr allgemein. Abgesehen von den südwestlichen Gemeinden des Gebiets, von Ylitornio, Alatornio, Tervola, der Ldg. Kemi und Simo, wo die Wiesengräser ebenfalls 75—80 % der Ackerfläche bedecken, umfassen diese überall im übrigen Gebiet über 4/5 der Ackerfläche. Beim Anbau von Wiesengräsern machte 1959 das zu trocknende Feldgras (Abb. 7) den Hauptteil aus. Auch darin lassen sich regionale Unterschiede auf die Weise erkennen, dass es in den südwestlichen Gemeinden des Läns Lappland sowie in Salla und Posio am wenigsten vorkam. In Alatornio, Tervola und der Ldg. Kemi betrug der Anteil des zum Trocknen angebauten Feldgrases nur 65—70 % der Ackerfläche. Am meisten wurde es in den Gemeinden Kolari, Kittilä und Sodankylä angebaut sowie in dem nördlich von ihnen gelegenen Gebiet, wo es über 80 % der Äcker umfasste.

Die relative Arbeitsintensität des Landbaus ist mit Hilfe des von den Kulturpflanzen erforderten Arbeitsaufwands ermittelt worden. Die Gewichtszahlen, die allerdings unter den Verhältnissen Südwest-

finnlands erhalten worden sind (Varjo 1958, S. 61), geben den von verschiedenen Anbaupflanzen beanspruchten Arbeitsaufwand an, verglichen mit dem vom Felsgrasbau benötigten. Die Verhältniszahlen der im Län Lappland wichtigsten Anbaupflanzen sind somit:

Feldgras	1	Roggen	3
Grünfutter	1	Kartoffel	7
Hafer	2	Wurzelfrucht	11
Gerste	2	Garten	30
Sommerweizen	2		

Multipliziert man die den Anteil der verschiedenen Pflanzen an der Ackerfläche bezeichnenden Prozentsätze mit den Gewichtszahlen der betreffenden Pflanzen, so ergibt sich ihr Anbaugewicht (vgl. Andreae 1964, S. 59—60). Die Summe der Anbaugewichtszahlen besagt die durchschnittliche relative Arbeitsintensität des Landbaus je Ackerhektar. Sie ist in Karte 8 dargestellt, nach der die relative Arbeitsintensität 1959 im Län Lappland auf die Weise schwankte, dass die geringsten Werte in seinen östlichen und nördlichen Gemeinden und die höchsten in seinem Südwest- und Südteil lagen. Doch ist zu bemerken, dass die Unterschiede in der relativen Arbeitsintensität des Landbaus im Jahre 1959 nicht annähernd so gross wie zehn Jahre zuvor gewesen sind. Während im J. 1950 im grössten Teil von Nordbottnien und Mittellappland der Wert der Arbeitsintensität des Landbaus 140 Punkte überschritt (vgl. Varjo 1967, Karten 34), war er 1959 nur in einer einzigen Gemeinde so hoch, woneben der Punktwert im grössten Teil des Läns höchstens 125 ausmachte. Dies erweist, dass sich im Landbau im Län Lappland eine schnelle Wandlung in extensiver Richtung vollzogen hat und immer noch vollzieht. Dies ist zweifellos durch die Klimaverschlechterung und besonders durch viele aufeinanderfolgende Nachtfrostjahre verursacht worden (vgl. Smeds 1960, S. 167—170; Varjo 1965 a, S. 4—11; Valmari 1966 u.a.), die seit Anfang der 50er Jahre im Län Lappland besonders die Anbaufläche von Getreidepflanzen stark eingeschränkt haben (vgl. Aario 1966, S. 138—141; Smeds—Fogelberg 1967).

Nach dem Obigen können im Län Lappland folgende Landbaugebiete unterschieden werden (Abb. 9):

1. *Das Südwestliche Küstengebiet.* Der Anteil des Ackers beträgt im Gebiet über 6 % von der Landfläche der Betriebe, und mit Ausnahme



Abb. 9. Die Ackerbauggebiete (links).

Abb. 10. Die durchschnittliche Kuhzahl der Herden 1959 (rechts).

der Gemeinde Simo gibt es je Betrieb über 5 ha Acker, welche Werte im ganzen Län Lappland die höchsten sind. Doch sind die Landgüter im allgemeinen von geringer Grösse und ihre Wälder spärlich. Auch ist die Unlandfläche auf den Landgütern des Gebiets in Anbetracht der Verhältnisse des Läns Lappland gering. Der Anteil der Getreidepflanzen ist hier grösser als im übrigen Län Lappland. Roggen wird zwar sehr wenig angebaut, aber Gerste nimmt über 10 % der Ackerfläche ein. Entsprechend ist der Anteil der Wiesenpflanzen an der Ackerfläche klein. Feldgras, das im Anbau der Wiesenpflanzen den Hauptteil ausmacht, wächst auf 75 % der Ackerfläche. Somit ist die Intensität des Landbaus im Gebiet relativ hoch, abgesehen von Karunki und Alatornio.

2. *Nordbottnien*. Der Anteil des Ackers an der Landfläche der Betriebe wechselt hier zwischen 3 und 6 % und die durchschnittliche Ackerfläche der Betriebe zwischen 3 und 5 ha. Die Landgüter sind jedoch in gewissem Masse grösser als im vorigen Gebiet, was darauf zurückzuführen ist, dass sie im allgemeinen mehr Waldland, aber auch mehr Unland als im Südostteil des Läns besitzen. Der Getreidebau ist im allgemeinen etwas weniger als in den südwestlichen Gemeinden des Läns. Das Land für Gerste umfasst 4—10 % der Ackerfläche, abgesehen von den Gemeinden, in denen es 10—15 % ausmacht. Entsprechend mehr wachsen Wiesenpflanzen. Die Werte der relativen

Arbeitsintensität des Landbaus bleiben denn auch etwas niedriger als in den südwestlichen Gemeinden des Läns.

3. *Mittellappland*. Der Anteil des Äcker macht unter 3 % von der Landfläche der Betriebe aus, und ihre durchschnittliche Ackerfläche beläuft sich auf 3—5 ha. Die Landgüter sind von beträchtlicher Grösse, und für sie ist die Reichlichkeit von Unland kennzeichnend. Roggenbau wird nur noch in Pelkosenniemi betrieben, aber auch da hat er 1959 nur 0.1 % der Ackerfläche eingenommen. Gerste dagegen wurde noch allgemein angebaut. Sie umfasste rd. 5—10 % der Ackerfläche, abgesehen von Kittilä und Savukoski, wo ihr nur noch 2—5 % der Ackerfläche zukam. Der Anteil von Feldgras betrug überall über 80 % der Ackerfläche. Die relative Arbeitsintensität des Landbaus war jedoch ungefähr von gleicher Grössenordnung wie im vorigen Gebiet, was unter anderem auf die allgemeine Verbreitung von Kartoffel zurückzuführen ist (vgl. Varjo 1967, S. 44—45, Abb. 26).

4. *Hinterappland*. Das Gebiet weicht vom vorigen in erster Linie durch den Teil der Ackerflächen ab, der in allen Gemeinden durchschnittlich kleiner als 3 ha ist. Auch der Anbau von Getreidepflanzen ist geringer. Roggen wird so weit im Norden nicht mehr angebaut, und auch der Anteil der Gerste liegt unter 0.5 % der Ackerfläche. Entsprechend bleiben auch die Werte der relativen Intensität des Landbaus niedrig.

Viehwirtschaft

Die Viehwirtschaftsgebiete im Län Lappland sind in erster Linie nach der Anzahl der Kühe, sowohl auf die Ackerfläche als auch je Betrieb berechnet, abgegrenzt worden. Ausserdem haben die Milcherzeugung im J. 1964 (MTH, Vervielfältigung 1966) und die relative Intensität der Viehwirtschaft Berücksichtigung gefunden (Varjo 1967, S. 64—65).

Die durchschnittliche Kuhzahl der Herden (Abb. 10) war im J. 1959 in den südwestlichen Gemeinden des Läns sowie in Salla und der Ldg. Kemijärvi am grössten oder drei Stück. Im übrigen wechselte sie zwischen 2 und 3 St., abgesehen von den Gemeinden Inari und Utsjoki, wo die Herden weniger als 2 Kühe zählten. Die Anzahl der Kühe je Ackerfläche (Abb. 11) dagegen war niedrig im grössten Teil des südlichen und mittleren Läns Lappland bis Muonio, Ldg. Rovaniemi und Savukoski, wo es 1959 je 100 Ackerhektar weniger als 70 Kühe gab. Auch in Inari war die Kuhdichte so niedrig. Am meisten

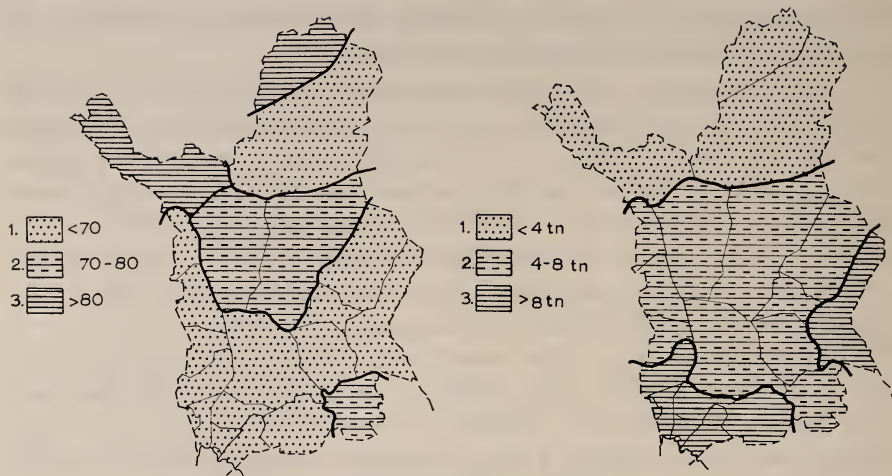


Abb. 11. Kühe je 100 Ackerhektar im J. 1959 (links).

Abb. 12. Die von den Molkereien entgegengenommenen Milchmengen je Lieferant im J. 1964 (rechts).

Kühe je Ackerfläche wurden in den Gemeinden Utsjoki und Enontekiö gehalten, wo die Kuhdichte über 80 Tiere je 100 Ackerhektar ausmachte.

Die von den Molkereien bezogene Milchmenge durchschnittlich je Lieferant (Abb. 12) war 1964 am höchsten im Südwestteil des Läns Lappland sowie in Salla, wo sie über 8 t betrug. In Alatornio, Karunki und Tervola, wo auch die Herden in Anbetracht der im Län Lappland bestehenden Verhältnisse gewiss gross waren, belief sich die Milchmenge je Lieferant auf über 11 t je Jahr. Die Menge verringerte sich gegen die Nordteile des Läns und betrug in Enontekiö rd. 2000 kg und in Utsjoki rd. 600 kg.

Ein Gesamtbild vom Charakter der Viehwirtschaft lässt sich unter Berücksichtigung der für die Pflege der verschiedenen Haustierte aufgewandten Arbeitsmenge gewinnen. Durch Bestimmen der für die Pflege von Haustieren verschiedener Herdengruppen erforderlichen Arbeitsmenge, verglichen mit dem für das Jungvieh notwendigen Arbeitsaufwand, ergeben sich ihre Verhältniszahlen. Es sind nach Andreae (1964, S. 70) folgende:

Jungvieh	1
Milchvieh	3
Schafe und Ziegen	0.2
Schweine	2



Abb. 13. Die relative Intensität der Viehwirtschaft im J. 1959 (links).

Abb. 14. Die Viehwirtschaftsgebiete im J. 1959 (rechts).

Das Bestimmen der relativen viehwirtschaftlichen Intensität setzt voraus, die Anzahl der Tiere auf 100 Ackerhektar umzurechnen. Multipliziert man die so erhaltenen Verhältniszahlen danach mit den betreffenden Gewichtszahlen und zählt man sie zusammen, so ist damit die relative Intensität der Viehwirtschaft bestimmt (Abb. 13). Sie war im J. 1959 am höchsten oder betrug über 300 Punkte in den nördlichen Gemeinden des Läns, in Utsjoki, Enontekiö, Kittilä und Sodankylä, aber auch weiter südlich in Ylitornio und Posio. Die kleinsten Punktmengen lagen im Südwesten, wo sie weniger als 200 Punkte ausmachten.

In der relativen Intensität der Viehwirtschaft ist im Län Lappland eine fallende Tendenz zu erkennen. Von 1950 bis 1959 verminderte sich ihre Punktzahl im gesamten Län von 295 auf 236 Punkte. Am meisten verringerte sie sich in Enontekiö und Utsjoki, wo die Abnahme über 400 Punkte ausmachte. Ausser in diesen Gemeinden sank in Inari, Kittilä und Muonio die relative Intensität der Viehwirtschaft auf knapp die Hälfte des Wertes vom Jahre 1950 (Varjo 1950, Abb. 50, Tabelle 55). Die Viehwirtschaft hat in diesen Gegenden im Verlaufe der 50er Jahre also einen ganz neuen Charakter angenommen. Am wenigsten veränderte sich die relative Intensität der Viehwirtschaft in den südwestlichen Gemeinden des Läns, in Ylitornio, Karunki, Ala-

tornio, der Ldg. Kemi, in Tervola und Simo, wo die Abnahme weniger als 50 Punkte betrug.

Nach den oben dargestellten Zügen der Viehwirtschaft lassen sich im Län Lappland folgende Viehwirtschaftsgebiete unterscheiden (Abb. 14):

1. *Das Südwestliche Küstengebiet.* Die Kuhzahl der Herden ist durchschnittlich grösser als im übrigen Gebiet des Läns. Da die Ackerflächen der Betriebe in Anbetracht der Verhältnisse des Läns Lappland gross sind, ist die je Ackerfläche berechnete Kuhzahl ziemlich gering. Die Milchleistungen der Kühe sind höher als im übrigen Län, was zu einem beträchtlichen Teil darauf zurückzuführen ist, dass ihre Nahrung fast ausschliesslich von den Äckern eingebracht wird. In der relativen Intensität der Viehwirtschaft sind in letzter Zeit keine nennenswerten Veränderungen eingetreten.

2. *Nordbottnien.* Die auf die Ackerfläche der Betriebe berechneten Viehmengen sind in diesem Gebiet grösser als im vorigen, aber die Kuhzahlen der Herden sind kleiner. Die Viehfütterung ist nicht ebenso intensiv wie im Südwestteil des Läns, was durch die ziemlich kleinen Ackerflächen der Betriebe bedingt ist. Somit kommt man dazu, die Kühe ausser auf den Feldern auch auf Waldweiden grasen zu lassen, wodurch die Milcherzeugung der Kühe geringer als im vorigen Gebiet bleibt. Die relative Intensität der Viehwirtschaft hat sich von 1950 bis 1959 in gewissem Masse oder um 50—200 Punkte vermindert.

3. *Salla.* Das Gebiet unterscheidet sich von dem vorhergehenden in erster Linie durch die grössere Kuhzahl und die höhere Milchleistung seiner Herden, Werte, die annähernd von der Ordnungsgrösse der Küstengemeinden sind. Die relative Intensität der Viehhaltung ist ungefähr die gleiche wie im vorigen Gebiet.

4. *Mittellappland.* Unterschiede gegenüber den zwei vorstehenden Gebieten sind die kleinere durchschnittliche Kuhzahl und die niedrigere Milcherzeugung der Herden. Auf dem Gebiet der Viehwirtschaft sind die Veränderungen in den 50er Jahren beträchtlich gross gewesen, denn ihre relative Intensität hat bis zum J. 1959 um 200—300 Punkte oder um etwa die Hälfte des Wertes von 1950 abgenommen.

5. *Hinterappland.* Die auf die Ackerfläche bezogenen Viehmengen sind sehr gross, weil man sie hauptsächlich auf Naturwiesen weiden lässt, die auch einen Teil des Winterfutters abwerfen. Dagegen sind die Kuhmengen der Herden kleiner als im übrigen Län Lappland, aus welchem Grunde die an die Molkereien gesandten Milchmengen klein

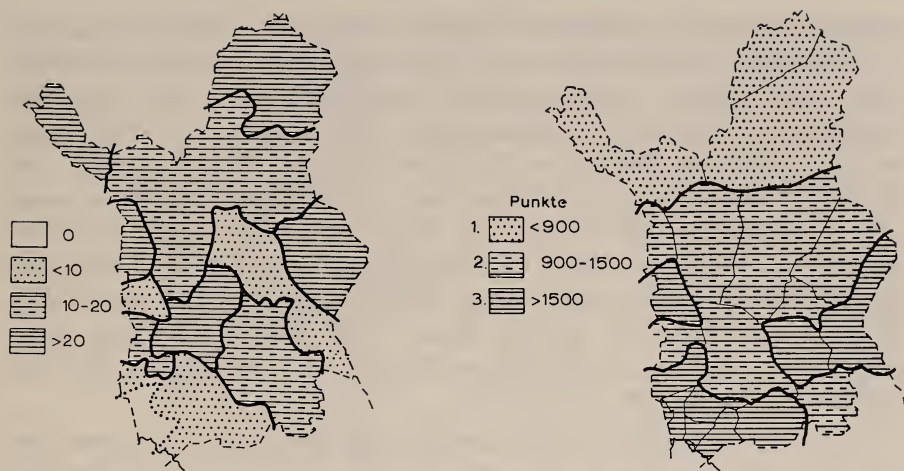


Abb. 15. Rene/km² 1964 (links).

Abb. 16. Die relative Intensität der Landwirtschaft je Betrieb 1959 (rechts).

sind. In der Viehwirtschaft des Gebiets haben sich in den 50er Jahren sehr grosse Wandlungen vollzogen. Ihre relative Intensität hat sich mehr als im übrigen Lappland vermindert.

Die regionale Differenzierung der Landwirtschaft

Ackerbau und Viehzucht machen zusammen die Landwirtschaft aus. Wenn es sich um das Län Lappland handelt, ist bei der Landwirtschaft darüber hinaus auch die Renhaltung zu beachten, der besonders in den mittleren und nördlichen Teilen des Läns eine beträchtliche wirtschaftliche Bedeutung zukommt (vgl. Helle 1966 u.a.). Die Rene sind mit Hilfe des nach Ren-Weidegemeinschaften eingeteilten Materials von 1959—64 betrachtet worden, das aus der Untersuchung von Helle (1966) herrührt. Die Rendichte (Abb. 15) ist im Län Lappland am geringsten in seinen südwestlichen Ren-Weidegemeinschaften. In Alatornio, Karunki und der Ldg. Kemi wird überhaupt keine Renhaltung betrieben, und bis in die Gegend Pello-Ranua kommen weniger als 10 Rene auf einem Landquadratkilometer vor. Die grössten Renmengen leben, abgesehen von einigen Ren-Weidegemeinschaften im Mittel- und Westteil des Läns, im Norden und Nordosten, wo diese Gemeinschaften im allgemeinen über 20 Rene/km² umfassen. In der Renhaltung lässt sich im Län Lappland ein Unter-

schied zwischen den einzelnen Gebieten auch darin erkennen, dass sie im Südwesten unverkennbar ein Nebenerwerb von landwirtschaftlich mehr oder weniger untergeordneter Bedeutung ist. Die durch die Renhaltung verursachten Arbeitskosten sind in diesem Gebiet gross, was teils auf dem Mangel an Fachkenntnis, teils darauf beruht, dass die Reichlichkeit der Anbauböden hier in der Renwirtschaft zu einer weit sorgfältigeren Bewachung der Rene zwingt als weiter nördlich, wo es wenig Kulturen gibt. Im Nordteil des Läns Lappland erfordert die Renhaltung dagegen sehr wenig Arbeitskosten, so dass sie dort als Haupterwerb betrieben werden kann. Die Renhaltung führt denn auch da für das an sie gebundene Kapital zu einer Rentabilität von über 25 % (Helle 1966, S. 52—57).

Wie oben festgestellt, haben sowohl nach den relativen Werten der Intensität des Landbaus als auch nach denen der Produktivität der Viehwirtschaft im J. 1959 im Län Lappland bedeutende regionale Unterschiede bestanden. Dasselbe lässt sich auch an den Werten der relativen Intensität der gesamten Landwirtschaft erkennen, an Zahlen, die durch Addition der relativen Werte der landwirtschaftlichen Intensität und der viehwirtschaftlichen Produktivität und durch ihre nachherige Umrechnung in bezug auf die durchschnittlichen Ackerflächen der Betriebe erhalten worden sind. Das Ergebnis ist auf Abb. 16 dargestellt. Demgemäss war im J. 1959 die relative Intensität der Landwirtschaft am niedrigsten in den drei nördlichsten Gemeinden des Läns, in Utsjoki, Enontekiö und Inari, wo sie durchschnittlich um weniger als 900 Punkte je Landgut geringer war. Die höchsten Werte wiederum lagen im Südwestteil des Läns sowie in Kolari, der Ldg. Kemijärvi und in Salla, über 1500 Punkte. Die relative Intensität der Landwirtschaft hatte sich am meisten vermindert (Abb. 17) in den nördlichsten Gemeinden des Läns, unter denen in Utsjoki, Enontekiö, Inari und Kittilä die Abnahme über 300 Punkte oder mehr als ein Fünftel vom Werte des Jahres 1950 ausgemacht hat. Dies bedeutet, dass in diesen Gegenden der auf dem Gebiet des Landbaus eingetretene Rückgang sich nicht durch den entsprechenden Anstieg der Viehwirtschaft hat ausgleichen können, sondern dass das Arbeitsangebot der Landwirtschaft in seiner Ganzheit steil abgenommen hat. In den südwestlichen Gemeinden des Läns sind die Veränderungen in der relativen Intensität der Landwirtschaft dagegen verhältnismässig gering gewesen. In Ylitornio, Karunki, Alatornio, der Ldg. Kemi, Tervola und Simo machten sie sogar weniger als 50 Punkte aus, so

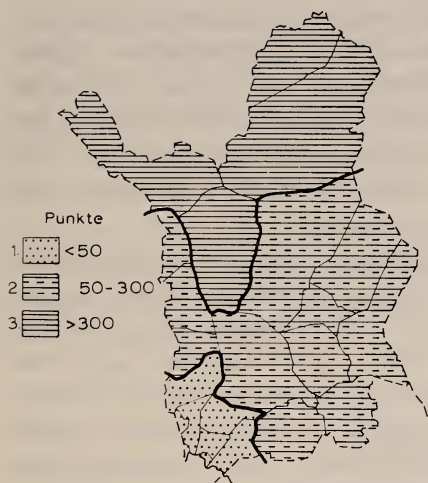


Abb. 17. Die Verminderung der Arbeitsintensität in der Landwirtschaft 1950—59 (links).

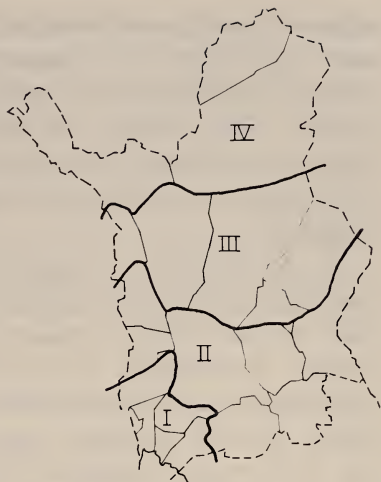


Abb. 18. Die Landwirtschaftsgebiete 1959 (rechts).

dass dort die Voraussetzungen der Landwirtschaft, Arbeit zu bieten, in den 50er Jahren so gut wie unverändert geblieben sind.

Gestützt auf die oben dargelegten regionalen Unterschiede in den Faktoren der Landwirtschaft, lassen sich im Län Lappland folgende Landwirtschaftsgebiete unterscheiden (Abb. 18):

I. *Das Südwestliche Küstengebiet.* Es ist in seinen Naturverhältnissen der vorteilhafteste Teil des Läns Lappland. Vegetationsperiode und Bearbeitungszeit sind am längsten, und die Niederschlagsmenge ist gross, aber nicht zu reichlich, und die Bodenverhältnisse sind in erster Linie dank den Flusslauf-Tonebenen vorteilhaft. Das Gebiet ist auch das am dichtesten besiedelte im Län Lappland, und das Strassennetz ist ebenfalls am dichtesten. Dank den zwei Städten des Gebiets, Kemi und Tornio, ist der Absatz der landwirtschaftlichen Erzeugnisse immer gut gewesen, was für die Entwicklung der Landwirtschaft einen günstigen Ausgangspunkt bedeutet hat. Die Ackerfläche der Landgüter ist in Anbetracht der Verhältnisse im Län Lappland ausgedehnt, obschon sie dennoch mit Rücksicht auf eine intensive Mechanisierung und Rationalisierung zu klein ist, zumal unter Beachtung dessen, dass die Landgüter im allgemeinen wüchsigen Waldboden in ziemlich geringem Umfang einschliessen. Der Acker ist grösstenteils mit Gras-

pflanzen bebaut, aber daneben wächst im Gebiet allgemein Gerste und sogar auch Roggen in gewissem Masse. Die Viehwirtschaft im Gebiet steht in Anbetracht der Verhältnisse Lapplands auf einem recht hohen Niveau. Die Herden sind ziemlich gross, und die Milchleistung der Kühe ist recht gut. Die Renhaltung ist als Nebenerwerb der Landwirtschaft von geringer Bedeutung, oder sie wird überhaupt nicht betrieben.

II. *Nordbottnien*. Die Naturverhältnisse sind in diesem Gebiet vom Standpunkt der Landwirtschaft schon in gewissen Masse ungünstiger als das vorige, in erster Linie durch das strengere Klima und das geringe Vorkommen von Tonbodenarten. Die Betriebe sind ihrer Ackerfläche nach durchschnittlich kleiner als im südwestlichen Küstengebiet, aber sie umfassen etwas mehr Wald. Getreidepflanzen werden nur noch wenig angebaut, wobei entsprechend mehr Wiesenpflanzen kultiviert werden. Die Viehmengen der Betriebe sind im Hinblick auf die Verhältnisse im Län Lappland mittelmässig, obschon in bezug auf die Ackerfläche viel Vieh gehalten wird. Die Milchproduktion der Kühe ist jedoch etwas geringer als im vorstehenden Gebiet, mit Ausnahme der Gemeinde Salla, die in dieser Hinsicht dem Südwestteil des Läns gleichkommt. Der Anteil der Renhaltung als Nebenerwerb der Landwirtschaft ist bedeutend. Die Renmengen der Ren-Weidegemeinschaften sind grösser als in den Küstengemeinden. Auch je Bodenfläche kommen weniger Rene als im grössten Teil des Gebiets vor.

III. *Mittellappland*. Landwirtschaftlich sind die Naturverhältnisse hier schon recht schwach. Die Vegetationsperiode ist ziemlich kurz, was im Verein mit der nicht unbeträchtlichen Höhe des Gebiets bewirkt, dass der Getreidebau nicht mehr möglich ist, abgesehen von der Gerste, die meistens noch einen Ertrag gibt. Die Ackerfläche ist denn auch grösstenteils mit Gras bebaut. Die Ackerflächen der Betriebe sind jedoch im allgemeinen klein, so dass man nur wenig Vieh halten kann. Die Einträglichkeit der Landwirtschaft wird erheblich durch die grosse Waldfläche der Landgüter des Gebiets verbessert. Deren gegenwärtige Ausdehnung könnte sogar noch erweitert werden, weil in die Landgüter des Gebiets Unland in beträchtlichem Umfang eingeht. Die Renhaltung ist im Gebiet von hoher Bedeutung. Sie wird grösstenteils als Haupterwerb betrieben.

IV. *Hinterappland*. Das Gebiet ist landwirtschaftliche Randgegend, in der das strenge Klima zusammen mit der nördlichen Lage des Raumes und seiner beträchtlichen absoluten Höhe das Ausüben

von Landwirtschaft stark einschränkt. Die Betriebe umfassen im allgemeinen wenig Acker, der fast ausschliesslich für den Anbau von Futterpflanzen benutzt wird. Der von den Äckern einzubringende Ertrag reicht jedoch nicht den Winter über für das Vieh aus, sondern wird zum Teil auf Naturwiesen geerntet oder anderswoher beschafft. Die Viehmengen sind aus diesem Grunde kleiner als im übrigen Län Lappland, und ihre Milcherzeugung ist gering. Da die südlichen Erwerbe hier grossen Schwierigkeiten begegnen, hat die Renhaltung eine sehr hohe Bedeutung erlangt. Die Renhalter sind denn auch fast ausschliesslich Renleute.

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ON THE LANGUAGE STRUCTURE OF THE FINNISH COUNTRYSIDE WITH A SWEDISH-SPEAKING MAJORITY

by

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THE PROBLEM AND THE METHODS OF STUDY

The bilingualism of Finland is distinctly a regional phenomenon. In rough terms, Finland is divided by language into two parts. The main part is Finnish by language, and then there is the part situated along certain stretches of the coast where inhabitants who speak Swedish as their mother tongue are concentrated. The transitional zone between the two parts is narrow, making it sensible to speak about a language boundary, on the one side of which the majority of the inhabitants are Finnish by language and on the other side Swedish. This language boundary coincides with certain communal boundaries, for whole communes are maintained as units in determining the linguistic status of the local populations.

The areas inhabited by the Swedish-speaking minority (7.4 % in 1960) do not form any single territorial entity but consist of separate coastal strips and groups of islands in the sea. Two main regions can be defined: the coast of South and Central Bothnia and the areas of southern and southwestern Finland with a majority of Swedish-speaking inhabitants. The latter category includes the province of Åland (Finn. *Ahvenanmaa*),¹ a group of islands that, having been established by law as Swedish by language, enjoys quite a special

¹ In this study the place names are written either in Finnish or in Swedish depending on the lingual majority of the commune in question.

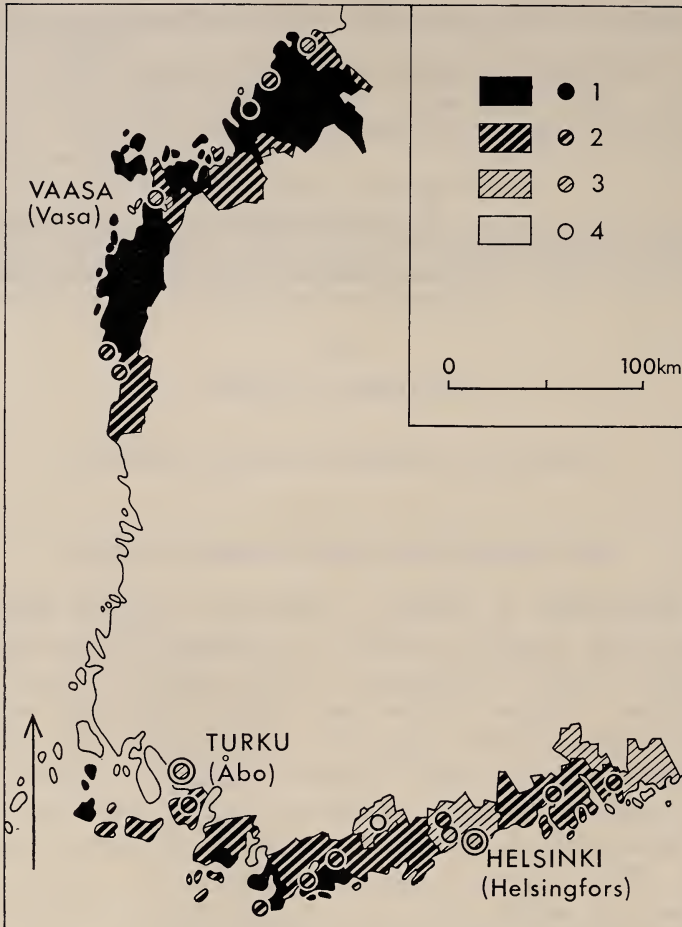


Fig. 1. The language structure of Finland in 1960 (excluding the Åland Islands). 1 = Swedish-speaking area. 2 = Bilingual area or town (with a Swedish-speaking majority). 3 = Bilingual area or town (with a Finnish-speaking majority). 4 = Finnish-speaking area or town.

status. The area of southern and southwestern Finland has been divided as the result of rather fresh developments into two districts, one of which lies on the western and the other on the eastern side of Greater Helsinki (Fig. 1).

On account of the relative decrease in the Swedish-speaking population, territorial changes have occurred in the linguistic structure of Finland. On the one hand, the language boundary in bilingual

areas has shifted closer to the coast — and even as far as the coastline. On the other hand, monolingual (Swedish) communes have become bilingual. Numerous researchers have given their attention to this development. My purpose in the present study is also to examine this same phenomenon, to some extent from a new vantage point. The material contained in the 1960 census offers better possibilities than ever before to observe the regional features of the language structure of the countryside, especially the population agglomerations¹ there. And by checking these regional structural features by means of certain statistical measures and tests, the observations made can also be verified. What is involved therefore is not actually an examination of changes in the linguistic structure so much as a determination of the situation prevailing in 1960 in rural communes with a Swedish-speaking majority. These communes by no means form homogeneous entities with respect to their linguistic structure; differences exist not only between the communes but also within the communes, as revealed, for example, by the agglomerations. Although my study is cross-sectional, it likewise facilitates forming and understanding a picture of the developmental process. Since, on account of their special position, the inclusion of the Åland Islands would not be sensible, the area covered by the study consists of those rural communes of South Bothnia and southern Finland with a Swedish-speaking majority.

THE FACTORS AFFECTING CHANGES IN THE LANGUAGE STRUCTURE

In Finland a change in the language structure means an expansion of the Finnish-speaking area. The ratio of the population claiming Swedish as its mother tongue is decreasing at a fairly steady rate (1940: 9.6 %; 1950: 8.6 %; 1960: 7.4 %; STV 1966, p. 32). Recently, the decrease has also been absolute (1940: 353,985; 1950: 348,286; 1960: 330,538 persons; STV 1966, p. 32). Many reasons have contributed to the relative decrease, which is reflected by changes in the language structure:

1) *Industrialization and urbanization* have brought Finnish-speaking migrants to originally Swedish or bilingual areas, with the result that the ratio between the two language groups has even been reversed.

¹ Agglomeration = village or hamlet with over 200 inhabitants.

This is what has happened especially in the Helsinki region (see, e.g., Klövekorn 1960, p. 16; Smeds 1960, p. 160; Fougstedt 1963, pp. 401—402), which is the only place where a predominantly Swedish-speaking district has been cut in half (the Swedish eastern part of Uusimaa province has been detached from the rest of the southern coastal zone inhabited predominantly by people whose mother tongue is Swedish). Elsewhere the change in the language structure has most conspicuously affected the communes situated against the language boundary.

2) *The natural increase in population* has been lower among Swedish-speaking than among Finnish-speaking inhabitants. The "vital revolution" leading to smaller families started first in Finland among the Swedish-speaking population, which deviates with respect to its social structure from the rest of the country's inhabitants (cf., e.g., Fougstedt 1951, p. 111, and 1963, pp. 408—409; Smeds 1960, p. 160). Since, furthermore, the age structure of the Finnish-speaking persons migrating to Swedish districts is more favorable from the standpoint of population increase than that of the original, Swedish-speaking inhabitants, the linguistic structure changes for this reason as well in the same direction (cf., Klövekorn 1960, p. 130).

3) *The refugees from the Karelian territory* ceded after the war to the U.S.S.R. have caused changes in the language structure, notably along the coast of southern Finland. In certain of the Swedish-language communes, the ratio of Karelian refugees is comparatively high (5—15 % of the total population). On the other hand, no commune in the Swedish area of South and Central Bothnia has a refugee population of more than 5 %, and in most of them the figure does not even rise to 1 % (see Purola 1964, Appendix I; Smeds 1960, pp. 160—161).

4) *The migration out of the Swedish-language communes* is of conspicuous proportions. The bulk of the migrants are attracted to Sweden, whereas there is only a slight shift of population to other parts of Finland. Where Swedish-speaking inhabitants do move from one locality to another in their own country, they remain for the most part within the limits of the Swedish-language area (Fougstedt 1951, p. 154; Purola 1964, pp. 87—90). The significance of the emigration of Swedish-speaking inhabitants, while on a considerable scale, should not, however, be overestimated from the standpoint of changes in the country's language structure (Smeds 1951, p. 85). The emigration areas, that is to say, must be considered underdeveloped (Fougstedt

1963, p. 412); hence the population »deficit» will not be appreciably filled by persons speaking Finnish.

5) There is a process of *assimilation of Swedish-speaking inhabitants into the Finnish-language community*. The language spoken by children born out of »mixed marriages» is determined primarily by the linguistic environment in which they grow up as well as by the language spoken by the mother. Accordingly, "mixed marriages" in Helsinki, in particular, tend to lead to Finnification, whereas such is not so much the case in the Swedish-language countryside (cf., Fougstedt and Hartman 1956, pp. 48—49). According to Fougstedt (1963, p. 401), during the period 1950—60 the significance of this Finnification to the decrease in the share of the Swedish-language population was considerable. Emigration caused a 6.5 % loss and Finnification one of 2.5 %, so the natural increase of 4 % among the Swedish-speaking inhabitants was insufficient to make up the total deficit.

THE RURAL COMMUNES WITH A SWEDISH-SPEAKING MAJORITY

The study areas comprise a total of 52 rural communes with a Swedish-speaking majority (Fig. 2). Twenty-two of these communes are situated in southern Finland and thirty along the coast of South and Central Bothnia. According to the 1960 census, the communes of the study areas had a total population of 171,967, of whom 80.4 % (138,342 persons) were Swedish and 19.6 % (33,625) Finnish by language. In spite of its larger number of communes, the Bothnian region had a slightly smaller population (85,283) than had the southern Finnish region (86,684). A characteristic feature, moreover, is the fact that the proportion of Finnish-speaking inhabitants is significantly lower in the former than the latter region (11.5 % and 27.5 %, respectively). This is graphically illustrated also by the maps depicting the language structure commune by commune (Fig. 1). The language boundary is correspondingly more clear-cut in the Bothnian region than in the heart of the highly advanced and greatly changed region of southern Finland, where, with the exception of remote island communities, the linguistic minority can no longer live in corresponding isolation.

In the preponderant part of the communes of the Swedish-language Bothnian region (24 communes), the Swedish-speaking inhabitants

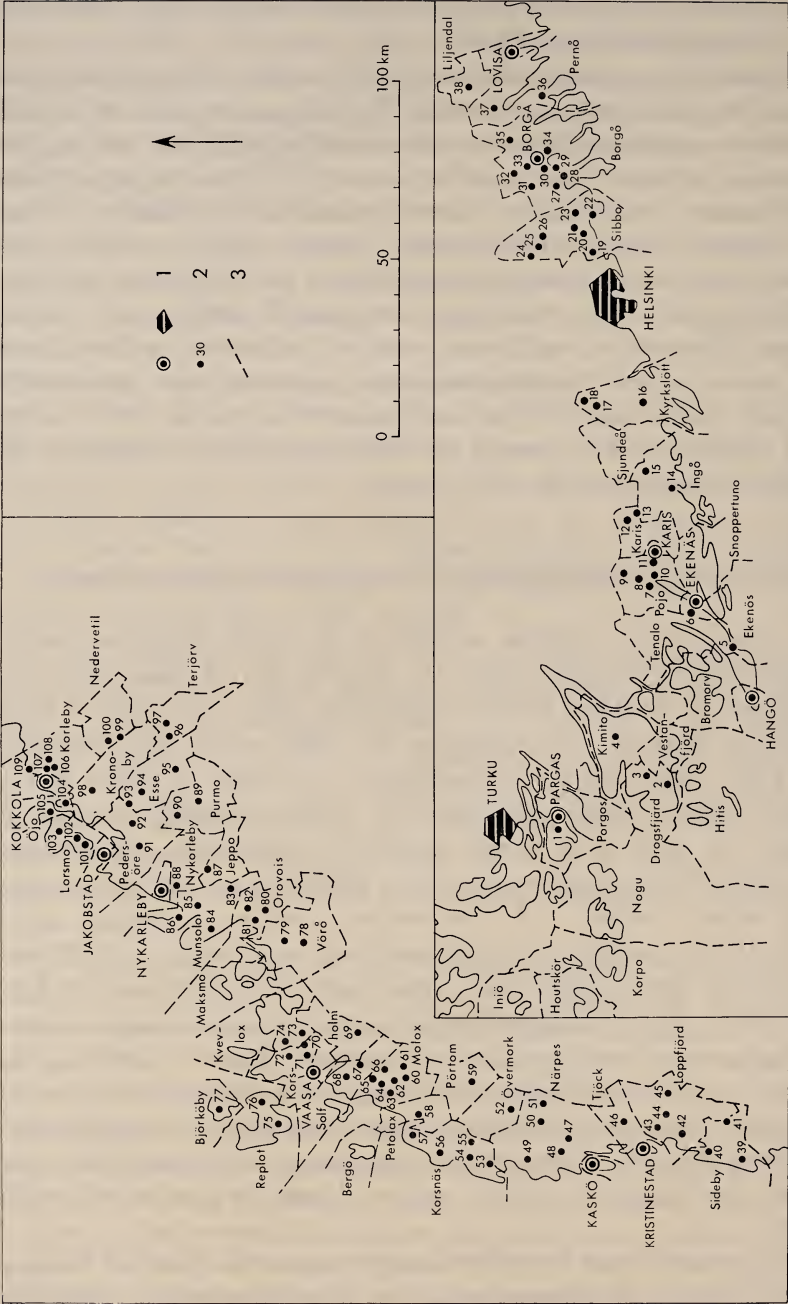


Fig. 2. Study areas. 1 = Town and city (over 100,000 inhabitants). 2 = Population agglomeration in the countryside and its number (see Appendix 1). 3 = Communal boundary.

account for at least 90 per cent — in certain cases as much as 100 % — of the population. In southern Finland only four communes exceed the 90 % figure, and not one is totally Swedish by language. Outside the Åland Islands, certain of the communes in South and Central Bothnia cling most steadfastly to the Swedish language. Such communes are to be found, on the one hand, in the coastal strip between the towns of Vaasa and Kaskö and, on the other hand, between Nykarleby and Kokkola, where the Swedish zone penetrates relatively deep into the hinterland. The sharpness of the language boundary here is demonstrated by, for example, the commune of Terjärv, where some 97 % of the inhabitants are Swedish by language, although the commune is bounded on three sides by totally Finnish-language communes.

In spite of the solidity of the Swedish bloc of Bothnian communes, it has three weak points, where the language structure is changing. One is the southern part (Klöverkorn 1960, pp. 53—54), which has long been slowly turning Finnish — mainly the communes of Sideby and Lappfjärd as well as, in addition to the small towns of Kaskö and Kristinestad, more recently the commune of Tjöck. The second weak point is the vicinity of the city of Vaasa, the largest urban center of South Bothnia, which is predominantly Finnish by language. Nearly one-fifth of the inhabitants of the commune of Korsholm, which borders on Vaasa, are Finnish by language, and nowadays also certain of its neighboring communes (Jeppo, Vörå, Oravais) are becoming Finnified. As prescribed by the Language Act, they are already designated as bilingual communes. This can no longer probably be explained simply on the basis of the proximity of Vaasa, but other factors as well have been at work, such as situation in the communications system, industrial expansion, etc. The third point of weakness is at the northern edge of the region, where the commune of Karleby, in the vicinity of Kokkola, which has a Finnish-speaking majority, is fast changing in its language structure (proportion of Finnish-speaking inhabitants in 1950: 35 %; in 1960: 44.5 %).

About one-third of the inhabitants of the study areas live in agglomerations and the rest in smaller hamlets and isolated houses. The proportion of Finnish-speaking inhabitants in the agglomerations (22.8 %) is higher than among the rest of the population (18.0 %), which indicates that the language structure changes more rapidly in places of concentrated settlement than elsewhere. In the following, chief attention will be given to regional features appearing in the

language structure of the agglomerations, especially in view of the fact that suitable statistical material can be obtained relating to the agglomerations, as was noted in the foregoing.

Agglomerations in the countryside

In the rural communes with a Swedish-speaking majority, there are a total of 109 agglomerations, 38 of them in southern Finland and 71 in the Bothnian region (Fig. 2). The differences in language structure between the various agglomerations are considerable (Table 1, Fig. 3). There are some in which no Finnish-speaking people live and, on the other hand, other communities — quite a few, in fact — in which, contrary perhaps to expectations, the majority of the inhabitants are Finnish by mother tongue. In communes with a majority of Swedish-speaking inhabitants, the main population center may thus have a Finnish-speaking majority (e.g., Veikkola, in the commune of Kyrkslätt, and Kirkonmäki, in the commune of Karleby).

Table 1. *The proportion of Finnish-speaking inhabitants in the agglomerations of the study areas in 1960.*

Finnish-speaking %	No. of agglomera- tions
under 10.0	59 ¹
10.0—19.9	13
20.0—29.9	14
30.0—39.9	6
40.0—49.9	8
≥ 50.0	9
Total	109

¹ In six of these nobody is Finnish-speaking. Source: SVT VI C:103 II.

The differences in the language structure of the agglomerations are apt to indicate a number of other differences between these communities. For example, the differences might involve the size of the communities, the nature of the local industries and other activities, as well as the distance from the language boundary.

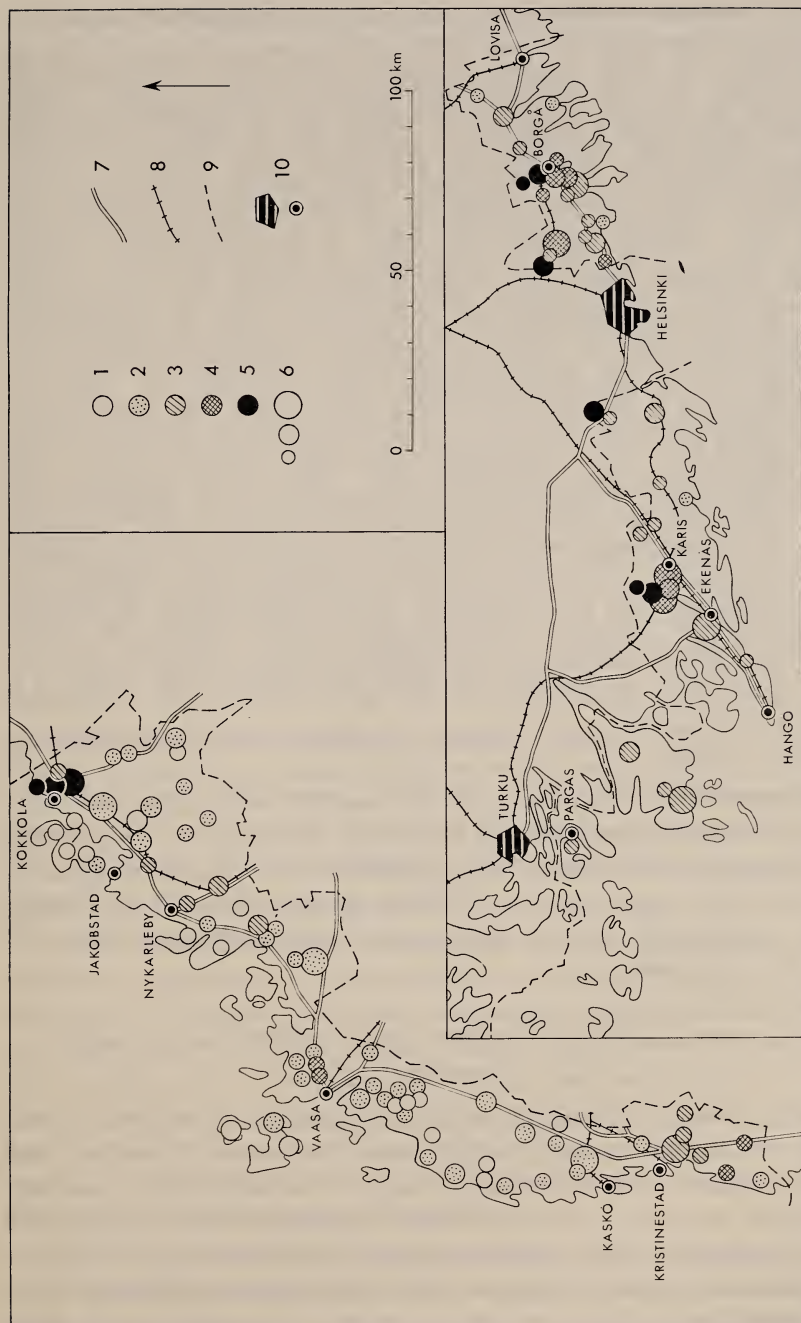


Fig. 3. Percentage of Finnish-speaking inhabitants of agglomerations in the countryside. Inhabitants speaking Finnish: 1 = 0.0–0.9 %. 2 = 1.0–9.9 %. 3 = 10.0–29.9 %. 4 = 30.0–49.9 %. 5 = 50.0 %. 6 = classes of agglomerations: 200–499, 500–999, over 1,000 inhabitants; 7 = numbered main highway; 8 = railroad; 9 = boundary of language area; 10 = city and other town.

The language structure and the size of the agglomerations

Reference was made in the foregoing to the fact that among the agglomerations are also comparatively large population centers, which have undergone rapid Finnification. There are grounds for assuming that communities with a significant population exert a pull on people living beyond the language boundary, whereas small agglomerations scarcely do. Largish communities tend to be progressive, offering opportunities for a livelihood. Finnification would thus be a cumulative factor from the standpoint of population. Growing communities grow faster than ever by virtue of an influx of Finnish-speaking people. The original reason for this progressive trend is likely, of course, to vary; perhaps, it is the proximity of a town (take, for instance, the agglomerations that have sprung up in the vicinity of Kokkola), perhaps the establishment of local industries, etc. The matter might be considered in the light, on the one hand, of the size of the agglomeration and, on the other hand, of the industrial structure. In the former case, the correlation could be worked out between the population of the agglomerations and the proportion of Finnish-speaking inhabitants. The value of the coefficient of correlation thereby obtained was $r = +0.270$ ($n = 109$). In testing the value by means of the t -test ($t = \frac{r}{\varepsilon_r}$, $\varepsilon_r = \sqrt{\frac{1-r^2}{n-2}}$, see, e.g., Alameri—Pöyhönen 1964, pp. 48 and 59), it will be noted that the value of " t " is statistically significant ($t = 2.842^{**}$). It can thus be observed with a 1 % risk that (on the average) with a growth of the proportion of Finnish-speaking inhabitants, the size of any given agglomeration will also grow. The ratio of Finnish-speaking inhabitants is thus greater in larger agglomerations and smaller in small ones.

The language structure and the distance from the language boundary

In cases where a Swedish-language commune is situated inconveniently in relation to the Finnish area, it is natural that the local language structure will not readily change. Certain island communes in particular are in this position. Their connections with the mainland are poor, in the first place, and the language boundary is apt to be at a remote distance, indeed. Moreover, with the declining fishing industry as the prevailing source of livelihood, these communities exert little

attraction on outsiders, so the original population decreases in absolute terms without its having any effect on the language structure (cf., Smeds 1951, p. 85). Accordingly, it is clear that, at least in certain instances, changes in the language structure depend on the distance of the communes concerned from the language boundary. Thus, the parish center of Björkö, which has grown up around the church on the island of Björköby, is 100 % Swedish by language, whereas the agglomeration of Kerkkoo, which is situated close to the language boundary in the rural commune of Borgå, is 99 % Finnish. It should nevertheless be noticed that many an agglomeration located hard by the language boundary continues to have a clear Swedish-speaking majority. For example, the hamlet of Hästback in the commune of Terjärv, which is located about 10 km from the language boundary, has a 100 % Swedish-speaking population. The correlation between the proportion of Finnish-speaking inhabitants and the distance to the language boundary of all the agglomerations of the study areas is nevertheless distinctly negative, $r = -0.475$, and the value obtained is statistically highly significant ($t = 5.655^{***}$). It can therefore be said, with a 0.1 % risk, that as the distance from the language boundary grows, the proportion of Finnish-speaking inhabitants on the average decreases. The distance from the language boundary is here regarded as the distance by main road or, in certain cases, railroad. In measuring the road distances to island agglomerations, ferry crossings over water have been included. By the language boundary is understood for the purposes of the present study — as the foregoing reveals — the boundary formed by communes with a Swedish-speaking majority against the Finnish-language area.

There are differences between the various districts in that the negative correlation is less marked in southern Finland, where the value of "r" deviates from zero only nearly significantly, whereas the deviation in the Bothnian region is highly significant. To some extent this is influenced by the small number of observation pairs ($n = 38$) in the former region, and partly by, among other things, the larger number of out-of-the-way coastal and island agglomerations in the Bothnian region. In the truly remote island communes of southern Finland, there are no agglomerations whatsoever.

Smeds has shown that in the proximity of the language boundary in the Bothnian region the process of Finnification takes place, as it were, in two ways. In both cases »forest settlements» situated at the

margins of communes with a Swedish-speaking majority are augmented by new settlers from the Finnish side of the language boundary. Frequently, these outlying areas have been settled originally by people speaking Finnish, but also originally Swedish-speaking settlements have been correspondingly enlarged by the arrival of Finnish elements (Smeds 1953, pp. 40—41). The result at all events is a gradual change in the language structure, and the changes in the language structure of agglomerations as a function of the distance to the language boundary is to some extent explained in this manner. The distance to the language boundary is likewise of significance in the changes taking place in the language structure of industrial communities, for a substantial part of the new arrivals there hail from the near vicinities (Klöverkorn 1960, p. 184).

The language structure and the occupational structure

Changes in the language structure may be expected to be connected with changes taking place in the occupational structure and in the economic life. The (Finnish-speaking) newcomers need by no means be divided according to the previous occupational structure of the district, that is, as preponderantly agrarian, although the Finnification of the »forest settlements» would seem to point in this direction. In general, the agricultural population in the Swedish-language districts, just as in the rest of the country, is excessively large, and there is nothing to be gained from clearing more land for further settlement (Smeds 1951, p. 79; Smeds 1963, pp. 26—28; Komiteanmietintö (Committee Report) 6/1962, pp. 66—69). In the Swedish districts of Uusimaa province, homesteads intended primarily for residential purposes have to a striking extent replaced regular farms, and the acreage under cultivation has actually decreased on account of the urban growth of the surroundings of Helsinki (Palomäki 1960, pp. 152 and 157).

In many places, industrialization and other business activity are known to be closely associated with the advance of the Finnish language. Wherever conditions become favorable to secondary and tertiary enterprise, opportunities open up for the further spread of the Finnish-speaking population. For example, in the community that developed around the railroad junction of Karis and rapidly became industrialized, a Finnish-speaking colony grew up at an early stage — in the middle of a Swedish-language district — and has steadily in-

creased in size (Vuoristo 1967, p. 19). Correspondingly, the population of communities favorably situated at highway intersections has in some cases undergone Finnification at a more rapid rate than the other, more out-of-the-way agglomerations in the same commune (Vuoristo 1966, p. 162). This development stems from the growing importance of the communities in question as local centers, which exert a gravitational pull on various enterprises and services (see also Klövekorn 1960, p. 200). On the other hand, however, many favorably situated agglomerations have preserved their original heavy Swedish-speaking majority (Vuoristo 1966, p. 53). A number of agglomeration types can probably be distinguished tentatively in this respect:

1) *Small, out-of-the-way communities*, which offer no job opportunities for migrants from beyond the language boundary, for even local inhabitants have been induced to seek such opportunities abroad. Such communities remain almost totally Swedish by language. One example is the parish center of Sideby (see Vuoristo 1966, p. 162).

2) *Growing agglomerations with a favorable situation in the traffic network within the Swedish-language area and with at least a moderate importance as functional centers*. Such communities attract fairly lively business activity; but the job openings are generally filled locally, so the influx of job hunters from the other side of the language boundary remains slight and the Swedish-speaking majority is safely preserved (e.g., Näsby, in the commune of Närpes; see Vuoristo 1966, p. 53).

3) *Agglomerations of the foregoing type which are situated close to the language boundary*, i.e., in areas where the Finnish language has steadily made headway to a greater extent than in the heart of the Swedish-speaking districts. Their language structure changes at a fairly steady rate owing to the arrival of Finnish-speaking entrepreneurs and their families (e.g., the parish center of Lappfjärd, see Vuoristo 1966, p. 53).

4) *Growing agglomerations which are undergoing vigorous urbanization, especially on account of industrialization*. Jobs open up abundantly, in greater numbers than the local inhabitants are capable of filling. The result is an influx of job hunters from the other side of the language boundary. In many cases, industry has been lacking in the nearby Finnish-speaking districts to absorb the manpower being released from agriculture (cf., Klövekorn 1960, p. 184). The language structure of such agglomerations changes rather rapidly. Examples

are Karis (see Vuoristo 1967, p. 19), Fiskars, in the commune of Pojo, etc. In a sense, this category includes the agglomerations that have developed in the proximity of towns with a Finnish-speaking majority and are strongly under their influence — e.g., the agglomerations of Karleby, in the vicinity of Kokkola.

Industrialization, in especial, thus seems to be a factor that leads to change in the language structure. This is true statistically, too, for the correlation between the proportion of Finnish-speaking inhabitants in the agglomerations and the proportion of inhabitants employed in industry and the building trade is highly significant ($r = 0.549$, $t = 6.535$ ***, risk: 0.1 %). As the proportion of workers in industry and the building trade increases in the agglomerations, so too does the proportion of Finnish-speaking inhabitants increase on the average. The agglomerations in the countryside are characterized therefore by the same feature as the towns. Vigorous industrial growth leads to a clear change in the language structure, as witness the instances of, among other communities, Vaasa, Kokkola, Jakobstad and Karis.

A positive correlation exists in the agglomerations also between business, traffic and services and the ratio of Finnish-speaking inhabitants ($r = 0.275$, $t = 2.895$ **, risk: 1 %), although the difference of "r" from zero is not in this case statistically quite so significant. This is due to the fact that this correlation is not at all observable separately with respect to the agglomerations in the region of southern Finland ($r = -0.151$, $t = 0.921$). The agglomerations of the Bothnian region, however, separately yield a highly significant positive correlation ($r = 0.399$, $t = 3.627$ ***). Further, the correlation between industry and "Finnification" is weaker on the part of the southern Finnish agglomerations than those of the Bothnian region. In the light of this observation, the generally accepted ideas as to the relationship between language structure and occupational structure seem to hold up mainly with respect to the Bothnian region, where the language boundary is noticeably clearer (see also Fig. 4). It is nonetheless important to bear in mind that the material relating to southern Finland is much more limited as far as drawing conclusions is concerned.

The language structure and other factors

In addition to the proximity of the language boundary, the size of the community in question and the occupational structure,

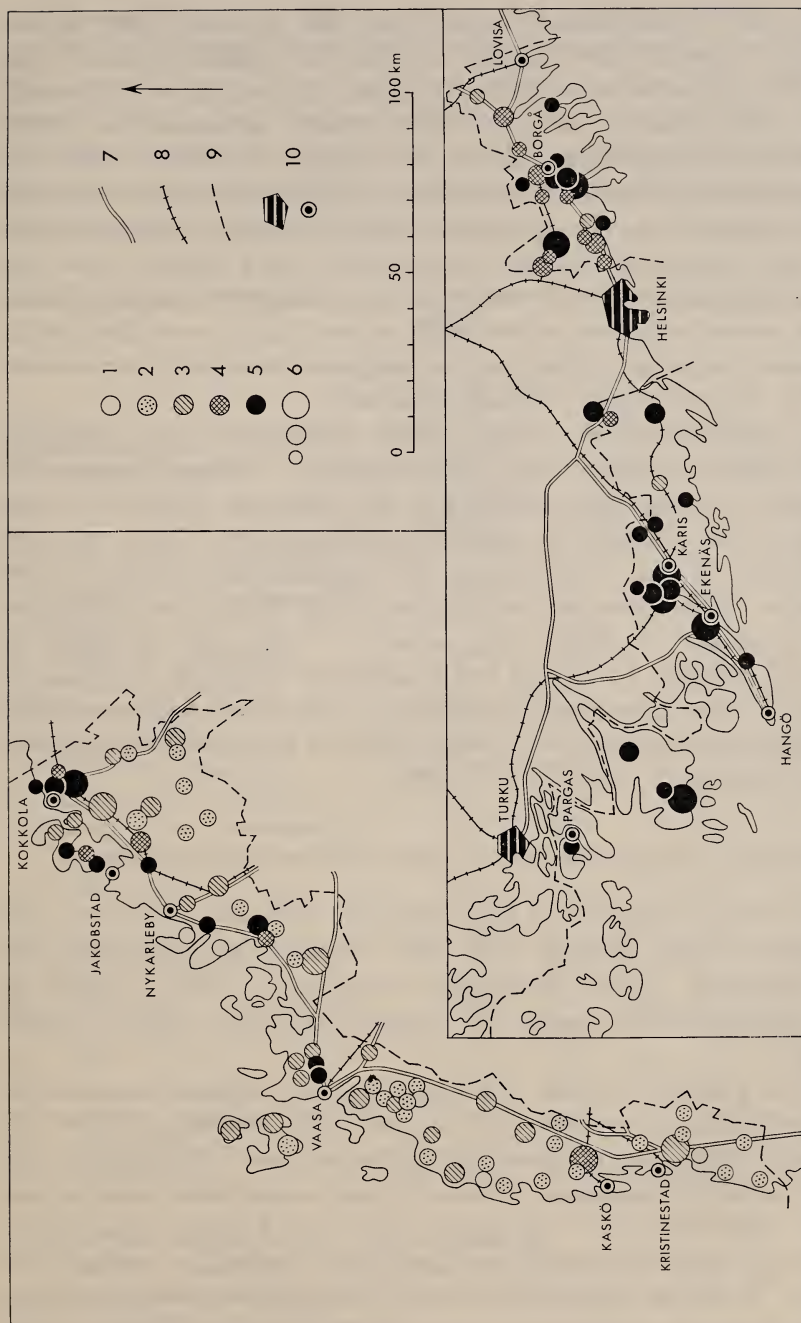


Fig. 4. Proportion of gainfully employed persons engaged in secondary and tertiary occupations. 1 = under 20 %. 2 = 20.0—39.9 %. 3 = 40.0—59.9 %. 4 = 60.0—79.9 %. 5 = 80.0 %. 6 = classes of agglomerations: see Fig. 3. 7 = numbered main agglomeration. 8 = railroad. 9 = boundary of language area. 10 = city and other town.

certain other circumstances as well are apt to shed light on the differences between the language structure of agglomerations. One of these circumstances is evidently the situation of any given community in the communications network, which greatly influences the likelihood of its undergoing a change of language structure. Actually, this communications factor is included among those already dealt with, namely, distance from the language boundary and the industrial structure. An unfavorable situation, specifically a long distance from the language boundary, was observed to prevent changes of language structure. A central situation in the traffic system, again, was observed in given cases (especially close to the language boundary) to promote indirectly changes in the language structure.

The establishment of certain social institutions (e.g., hospitals, military garrisons, prisons, etc.) in a Swedish or bilingual community is also apt to bring about changes in the language structure in the event that their personnel is mainly Finnish-speaking. There are very few examples of this to cite among the agglomerations situated in the study areas. Most prominent among them is the Nickby mental hospital in the commune of Sibbo, the majority of the staff of which is Finnish by language. This has had a significant effect on the language structure of the agglomeration consisting of the parish center of Sibbo and the hospital community of Nickby (41.3 % Finnish-speaking, 1960) (see also Klövekorn 1960, pp. 197—198).

Examples of agglomerations differing in language structure

The language structure of agglomerations situated in districts with a Swedish-speaking majority has been examined in a general light in the foregoing. In the following a brief survey will be made of certain agglomerations against the background of the results already reported.

Table 2 presents, on the one hand, the nine agglomerations with a Finnish-speaking majority and, on the other, correspondingly the nine most preponderantly Swedish agglomerations, of which six are wholly Swedish by language. The ninth place would have been claimed by three agglomerations (all having 0.4 % of Finnish inhabitants), but the one with the largest population was picked for inclusion in the table. It will be observed that the differences between the groups of agglomerations are distinct in other respects besides language structure.

The agglomerations with a majority of inhabitants speaking Finnish are, in the first place, larger than those that are Swedish by language. Only three in the former category have less than 500 inhabitants, whereas the majority, or seven of the latter are that small. Insofar as averages might be worked out on the basis of such limited data, the mean size on the former agglomerations would be 700 inhabitants and that of the latter only 370.

Table 2. *Certain agglomerations in communes with a Swedish-speaking majority (1960).*

Agglomeration and commune where situated	Percentage of Finnish-speaking inhabitants	Population	Distance from language bound- ary, km	Occupational structure ²		
				I	II	III
1. Kerkkoo (rural commune of Borgå)	98.9	364	2	66.3	17.8	15.9
2. Halkokari ¹ (Karleby)	97.6	413	1	46.8	47.4	5.8
3. Veikkola (Kyrkslätt)	87.7	571	3	40.7	42.0	17.3
4. Antskog (Pojo)	82.1	212	1	71.6	17.0	11.4
5. Talma (Sibbo)	73.5	603	2	39.5	32.8	27.7
6. Palonkylä ¹ (Karleby)	71.8	586	1	55.3	32.2	12.5
7. Kirkonmäki ¹ (Karleby)	58.1	1 985	1	41.7	46.8	11.5
8. Finnby (rural commune of Borgå)	50.9	634	8	51.8	25.7	22.5
9. Fiskars (Pojo)	50.2	934	6	63.7	18.3	18.0
10. Björkö (Björköby)	0.0	503	53	33.1	15.6	51.3
11. Bosund (Larsmo)	0.0	490	27	39.7	20.6	39.7
12. Malax parish center (Malax)	0.0	297	15	20.9	24.7	54.4
13. Österyttermark (Närpes)	0.0	278	15	10.6	13.9	75.5
14. Taklax (Korsnäs)	0.0	250	30	13.1	13.1	73.8
15. Hästback (Terjärv)	0.0	203	10	26.0	11.5	62.5
16. Harrström (Korsnäs)	0.3	323	35	4.8	10.1	85.1
17. Knifsund (Öja)	0.3	310	13	14.6	30.5	54.9
18. Ytteresse (Esse)	0.4	678	25	25.0	11.1	63.9

¹ Parts situated within the city limits of Kokkola.

² Occupational classification of population: I Industry and handicrafts, II Trade, communications and services, III Others.

Sources: SVT VI C: 103 II, IV and XI.

The difference between the groups of agglomerations is quite marked with respect to distance from the language boundary. The communities with a Finnish-speaking majority all lie at a distance of less than 10 km from the language boundary, many of those preponderantly Swedish as much as several dozen kilometers away.

The differences between the communities with respect to their occupational structure are also clear-cut. The Finnish ones are markedly industrial and commercial, those with a Swedish-speaking majority remaining largely agrarian (the column headed "others" includes preponderantly persons occupied at agriculture and forestry as well as fishing). It is interesting to note that the agglomerations that have become relatively most heavily industrialized have long been the scene of industrial activity. Thus, Antskog and Fiskars got their start as long ago as the 17th century, and one of the ski factories of Kerkkoo was founded in the year 1900. The Swedish-speaking population therefore has not been able in all cases to maintain its original position even in old industrial localities, for industrialization near the language boundary has resulted in a change in the language structure.

Types of agglomerations

In a general way, the basic type of *wholly or preponderantly Swedish agglomeration* in the countryside may be represented as a small community of a few hundred inhabitants situated rather far from the language boundary. At the same time, it is likely to be situated in the immediate vicinity of the coast or in the islands. Besides agriculture and forestry, fishing also in many cases ranks high among local occupations. Since the linguistic distribution of the agglomerations is skew (see Table 1), this type of agglomeration is the most general in the areas with a Swedish-speaking majority. Over half the total of 109 agglomerations represent this type.

The agglomeration with a Finnish-speaking majority is almost the diametric opposite of the type just described. It is of medium size as agglomerations go and is situated in the immediate proximity of the language boundary, either on the inland side of the Swedish area or on the outskirts of some important town. As to occupational structure, it is urban and, particularly, industrial. This type of agglomeration is not numerous (9, all told), though closely resembling

it are those communities in which Finnish-speaking inhabitants account for 30.0 to 49.9 % of the population (14 agglomerations).

Between these main types are *some communities of varying character*. By and large, their only common feature is a Swedish-speaking majority, which varies in size. According to this variation, they are closer to one or the other of the basic types. Such agglomerations as have a very clear-cut Swedish-speaking majority (over 80 %) but in other respects correspond to the Finnish-speaking type of agglomeration (e.g., the parish centers of Ingå and Munsala) must be considered as exceptional.

The rest of the countryside

It was noted in the foregoing that the majority of the Finnish-speaking inhabitants live in agglomerations. Considerable numbers of persons claiming Finnish as their mother tongue also live in sparsely populated rural communities or in isolated homesteads. There is reason to assume that certain observations applicable to agglomerations also apply to the rural countryside proper. This is true, for example, of the matter of distance to the language boundary. This is indicated by the aforementioned study by Smeds, which refers to the Finnification of "forest settlements" (not agglomerations) situated near the language boundary. Also the map drawn up on the basis of communes (Fig. 5), which presents the numbers of inhabitants living beyond the limits of the agglomerations, shows that the Finnish-speaking rural inhabitants are concentrated in the communes situated close to the language boundary. An agrarian population is evidently involved in part, but also included are families living near agglomerations and even towns who are dependent for their livelihood on secondary and tertiary occupations.

On language structure and planning

The communes considered here are, in accordance with the Language Act of Finland, a) monolingual Swedish communes (with less than 10 % of Finnish-speaking inhabitants), b) bilingual communes (with a Swedish-speaking majority and the Finnish-speaking inhabitants accounting for 10.0 to 33.3 % of the total), or c) bilingual communes (with the majority speaking Swedish and 33.4 to 49.9 % Finnish). In the foregoing, however, considerable internal differences



Fig. 5. Actual rural population. 1 = communal boundary. 2 = city and other town. 3 = rural inhabitants living outside the limits of agglomerations (black sector = proportion of inhabitants speaking Finnish).

in language structure of the communes were noted, differences which only a law with a break-down of provisions to the agglomeration level could take into account. Such a change in the scale of the language legislation would not, however, have any noteworthy practical significance.

In conjunction with municipal reform, regional changes are taking place also in the language structure. As a special feature, it might be mentioned that along with the decrease in the Swedish-speaking population, the bilingual area is nevertheless likely to increase slightly owing to the consolidation of communes. Thus, in the Turku region, a purely Finnish-speaking commune (Kaksikerta) was annexed on January 1, 1968, by the city of Turku, thereby legally changing into a bilingual community. Corresponding municipal mergers are to be expected to occur again, at least in the vicinities of Turku and Porvoo. On the other hand, the incorporation of communes and the formation of greater municipal areas are apt in places to lead in the opposite direction. If, for instance, the bilingual commune of Pyhtää (on the western border of Kymi province) would be joined to its neighboring Finnish-language communes, it would, in spite of its sizable Swedish-speaking minority, become purely Finnish in the eyes of the law. The agencies passing upon proposed communal mergers would thus do well to consider matters also in the light of the internal language structure. In connection with the measures of incorporation, certain boundary changes might perhaps be contemplated with this in view. Thus, agglomerations with a Finnish-speaking majority or otherwise rapidly growing Finnish population which are situated in the proximity of the language boundary might be expediently incorporated into projected future Finnish-language communes of expanded size. Correspondingly, agglomerations with a significant Swedish-speaking minority might be incorporated into the expanded bilingual communes of the future.

SUMMARY

The language structure of agglomerations varies considerably in rural districts with a Swedish-speaking majority. In addition to the wholly Swedish-speaking and the bilingual communities, there are some that are almost purely Finnish by language. The dependence of language structure upon the size of the agglomeration, distance from the language

boundary and the occupational structure is statistically clear-cut. Three types of agglomerations can be distinguished:

a) Small, conspicuously Swedish-speaking rural communities, which are situated rather far from the language boundary and are agrarian by occupational structure. This is the commonest type of agglomeration.

b) Agglomerations with a Finnish-speaking majority. They are of medium size and are situated in the proximity of the language boundary. The occupational structure is urban. This type includes only 9 agglomerations; but also those communities with 30.0 to 49.9 % of Finnish-speaking inhabitants rank close to the same category (they seem to be in the process of falling into it).

c) Intermediate forms.

The changes in the language structure may be regarded as generally advancing from the language boundary, especially where significant industry has developed near the boundary (on the Swedish side). The rapid urbanization of the coastal centers also leads, however, to rapid change in the language structure. This is what has happened in the vicinities of Helsinki and Kokkola, and a corresponding developmental process seems to be underway in the environs of Vaasa. If, in such a case, a coastal center is situated in the middle of a Swedish-language district, the result is a division of the district into two parts (the language boundary being thrust into the sea).

The present study further brings to the fore the fact that, in planning the consolidation of separate communes to form larger municipalities — a timely issue in Finland —, the powers that be should take into account internal differences within the communes with respect to their language structure in addition to the official linguistic status of these communes as municipal entities.

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Appendix 1. Agglomerations in the countryside of the study areas (numbering the same as in Fig. 2).

- | | |
|----------------------------|----------------|
| 1. Ingå parish center | 12. Antskog |
| 2. Tähtelä | 13. Billnäs |
| 3. Svartå | 14. Fiskars |
| 4. Svartå railway station | 15. Äminnefors |
| 5. Kyrkslätt parish center | 16. Drägsby |
| 6. Haapajärvi | 17. Estbacka |
| 7. Veikkola | 18. Finnby |
| 8. Liljendal parish center | 19. Hamari |
| 9. Forsby | 20. Hinthaara |
| 10. Isnäs | 21. Illby |
| 11. Pojo parish center | 22. Kerkkoo |

- | | |
|------------------------------|----------------------------------|
| 23. Tarkis | 67. Paxal gränden |
| 24. Tolkis | 68. Vias gränden |
| 25. Nickby parish center | 69. Munsala parish center |
| 26. Box | 70. Kantlax |
| 27. Martinkylä | 71. Pensala |
| 28. Söderkulla | 72. Vexala |
| 29. Talma | 73. Böle |
| 30. Träskby | 74. Helsingby |
| 31. Vesterskogen | 75. Karperö |
| 32. Östersundom | 76. Smedsby |
| 33. Österby | 77. Närpes parish center (Näsby) |
| 34. Lappvik | 78. Kalax |
| 35. Björkboda | 79. Norrnäs |
| 36. Dalsbruk | 80. Österyttermark |
| 37. Kimito parish village | 81. Vesteryttermark |
| 38. Ersby | 82. Oravais parish center |
| 39. Nedervetil parish center | 83. Kimo |
| 40. Tast | 84. Oravais bruk |
| 41. Björkö | 85. Petalax parish center |
| 42. Jeppo railway station | 86. Bennäs |
| 43. Kirkonmäki | 87. Källby |
| 44. Halkokari | 88. Pörtom parish center |
| 45. Kaustar | 89. Purmo parish center |
| 46. Palokylä | 90. Lillby |
| 47. Kvevlax parish center | 91. Replot parish center |
| 48. Kalvholm | 92. Södra Vallgrund |
| 49. Korsnäs parish center | 93. Sideby parish center |
| 50. Harrström | 94. Skaftung |
| 51. Molpe | 95. Ömossa |
| 52. Taklax | 96. Solf parish center |
| 53. Töjby | 97. Sundom |
| 54. Kronoby parish center | 98. Terjärv parish center |
| 55. Lappfjärd parish center | 99. Hästbacka |
| 56. Dagsmark | 100. Påskmark |
| 57. Härkmeri | 101. Nykarleby parish center |
| 58. Perus | 102. Vörå parish center |
| 59. Bosund | 103. Tuckur |
| 60. Furuholmen | 104. Övermark parish center |
| 61. Risöhall | 105. Överesse |
| 62. Malax parish center | 106. Lappfors |
| 63. Bränno | 107. Ytteresse |
| 64. Havras gränden | 108. Knifsund |
| 65. Köpings gränden | 109. Norra Långö |
| 66. Nymans | |

A NEW EQUAL AREA PROJECTION OF THE WORLD

by

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In bygone days and still at the beginning of this century the world seemed unbelievably vast and enigmatic. Seas and continents waited for their explorers and from all practical points of view the earth ended with the Arctic and the Antarctic. Nowadays our perspectives are different and it is no longer of theoretical interest only to have as true as possible a concept of the world, it is imperative. We must know what we are talking about when discussing far away countries.

This is a challenge to geography. Our present picture of the world was drawn mainly during the last century and the beginning of this. The great men who founded modern geography did their job so well that since then most geographers have felt free to concentrate on their home countries or their specialized problems and there has been an unmistakable tendency to fractionize the subject just as if our predecessors had once and for all drawn a valid overall picture of the world.

This has had to do also with a fear of "description", a concept long considered scientifically "dirty", which has led a generation of geographers to deny that geography is what its name says, which in turn has led to a peculiar discussion of what else it is. On the other hand, this very fear of description has diverted interest from regional geography. No wonder that it all too often turns out to be mere description, an enumeration of data and more data, on rocks, morphological processes, elevation, reduced temperatures, cities, crops and cranes, historical curiosities and folklore, the abominable contents

of many text books in which each country or region is served the reader like a box of candy, brim full of facts according to the authors' experiences and tastes.

Of course, when summing up their knowledge the great geographers of previous generations did not say the last word, they said the first. Today it is time for geographers to turn their minds to regional and global problems.

In so doing we must rid ourselves of the idea that regional geography is necessarily a personal matter in the sense that two writers on the same region are bound to differ. We must agree on something which might be called a grammar of geography making it possible to speak the same language and arrive at the same results when examining the same country just as two doctors do when examining the same person or two chemists analysing the same substance.

Here a vast field is calling for rejuvenation. Surely many geographers have worked in it and lately much has been accomplished by individual authors as well as within the IGU commissions on mapping the world, its land use and population and by groups of collaborating geographers, statisticians and linguists, settling rules for classifications and compiling dictionaries of geographical terms. But the bulk of the job still remains to be done if we aim at an intelligible cognitive description of our modern world. The present paper is an attempt to solve one basic problem in this context, that of making a world projection for modern readers, for whom the world does not end with the Arctic, who use aircraft and fear missiles and consequently are interested in directions and distances.

The projection here shown is azimuthal and equal area, centred on the North Pole. The central part, 90° — 20° N, is according to Lambert. To this central part, representing one third of the world, are added four lobes, each covering one sixth of it. The lobes are equidistant along all radii, the distance between each degree of latitude being equal to that between 21° and 20° N in the central part. The lobes were made equal area by adjusting their width. In the table below distances from the pole to every tenth degree of latitude are given, the diameter of the globe being 10,000.

Since there is no perfect solution to the problem, it is necessary to discuss it against a list of preferences. The so called cardinal virtues of maps have to be considered but there are also other qualities calling for attention.

Fig. 1.



Table 1.

Latitude	Distance from the North Pole	Latitude	Distance from the North Pole	Latitude	Distance from the North Pole
N 90°	0	N 20°	5736	S 40°	10026
80°	872	10°	6451	50°	10741
70°	1736	0°	7166	60°	11456
60°	2588	S 10°	7881	70°	12171
50°	3420	20°	8596	80°	12886
40°	4226	30°	9311	90°	13601
30°	5000				

The map must be *easily understood*, if possible self-explaining. That is not the case with rectangular or elliptic maps. Interrupted projections are also difficult, even if most readers are not as ignorant as the person who combined the discussion on the cold war and the split world with Goode's projection remarking "is it really that bad?" The present projection has the quality mentioned and should there be anybody who does not understand the projection, he can easily be convinced by removing the skin of an orange with two cuts at right angles on the reverse side.

To be generally accepted the projection must be *unprejudiced*, it mustn't stress one part of the world at the cost of others as has been the case for generations, Europe as the center, North America in the upper left hand corner and Japan to the right, grossly distorted. The present projection meets this requirement. It can be studied from any angle. In this respect it resembles the projection of the UN emblem, which certainly has to be impartial.

It is important that *latitudes* should be clearly shown on a world projection because of the great climatic impact of distances to the equator and the poles with its manifold consequences. This is often stressed as a main advantage of cylindrical projections. The present projection fulfills this requirement, the equator and the parallels being clearly shown at the same time as the poles are marked, an advantage which cylindrical projections lack. People are accustomed to the parallels being shown as straight lines, but that is no reason not to draw them correctly, as circles.

Of the cardinal virtues that of *true areas* is essential in this context. The advantage of the present projection as compared to other azimuthal polar projections, e.g. those of the United Nations and the U.S. Air Force lies here. They are all grossly incorrect in this respect.

True shape is a quality which can never be arrived at on maps comprising large parts of the globe. As a matter of fact this quality ought not to be emphasized in connexion with global maps. It can be taken care of on maps of small regions. Nevertheless many cartographers in drawing world maps try to be virtuous in this respect, at the expence of size. That is what has happened to the two projections just mentioned. The quality of absolute equal area is sacrificed to relative gains as to shape. The consequences of this are far more serious than people seem to have observed. Fantastic ideas about size and importance of different countries are the result, misconceptions

against which not only laymen are defenceless, but also a majority of geographers, who have never worked with projections since they took elementary cartography at university. On maps of large parts of the world shape is a theoretical concept never seen by any human eye, not even by the astronauts.

In its central part, however, the present projection is fairly true to shape and the lobes are not worse than many other maps. This is a problem of relative advantages. By increasing the number of lobes and by making them cut deeper into the central part better shapes could have been obtained but at the expense of continuity and with the result of cuts in the continents.

True distances is also a virtue nonexistent in world maps, except along certain lines. The present projection is approximately equidistant from the center, errors being $\pm 15-5\%$.

One of the desired virtues in projections is that *great circles should be represented by straight lines*. In the present projection this is the case with the meridians within its central part and along the axes of the lobes.

Finally *continuity* is of importance, which means that interruptions have to be shunned. From this point of view the present projection is better than most interrupted world projections and particularly since the lobes fit each other even the layman in his imagination can adjust the map to fit the surface of the globe like the skin of the orange mentioned above.

Oblique versions of the projection can be drawn centred on any point even if it entails a large amount of work. This is however facilitated by the Lambert equal area projection gaining ground as the best way of showing continental regions and by the work of cartographers of last century who calculated equidistant azimuthal grids for every fifth degree of latitude (see Karlheinz Wagner, *Kartographische Netzentwürfe*, Leipzig 1949). This allows the construction of a series of projections on the reasonable idea that no longer Europe alone but every country is the centre of its own world. The author has published one such projection centred between London-Paris and one centred midway between New Zealand and Australia (Ymer 1968). Two more versions, one centred on Indiana and one on Peking will be published in an atlas of the United States now in preparation.

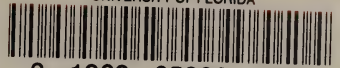
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